THE ENGINEERING AND MINING JOURNAL.

HENRY W. ROY—DEL. COLLINS & SHUGG, SC.

VOL. VIII.—No. 7.—THIRD SERIES.] NEW-YORK, TUESDAY, AUGUST 17, 1869. [SINGLE COPIES, 10 CENTS.

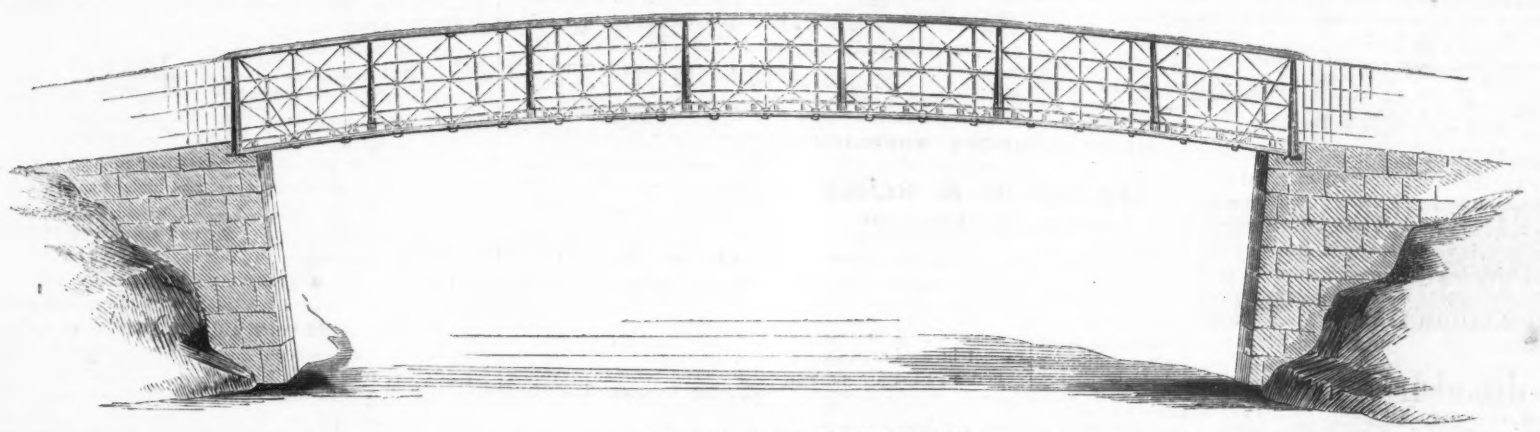
The New Bayonet.

THE proposed new bayonet of the British infantry is the same as that supplied to the Irish constabulary. It is a saw-sword bayonet—that is to say, it has a sword-edge and a saw-back, while the point is as effective as that of an ordinary bayonet. It is of the same length as the present weapon, but the Martini-Henry rifle itself is 3¼ inches shorter than the Snider-Enfield, and the total length of the arm as a pike is, therefore, reduced by so much. The committee, in recommending this saw-sword bayonet, appear to have had in view the fact that bayonets will henceforth be less frequently used than in former times as weapons of offence and defence; they desired, therefore, to substitute an instrument of more general utility. The efficiency of the weapon as a sword, as a saw, and as a bayonet, was carefully tested. With the sword-edge a sheep was cut up into joints; and with the saw-back the shin-bone of an ox, a Norway spar, 2½ inches in diameter, another of 3¾ inches, and a 3-inch balk of very tough dry elm were sawn through. The weapon, fixed to the rifle, was also thrust through a dead sheep with its wool on and wrapped in a great-coat; and the security of the attachment of the weapon to the rifle was tested by twisting it about inside the sheep, and by driving it six inches through a one-inch door, and allowing it to swing while sticking in the wood. Thus the soldier will have a tool as well as an effective military weapon, and one with which he can clear away wood, cut materials for fascines and gabions, or he can use it if he likes as a knife for cutting up his rations. Among the other recommendations contained in the supplementary report of the Breech-loading Committee is one to the effect that muzzle-stoppers should be reintroduced in order to preserve the barrels from rain and dust, and thus to avoid the necessity for too frequent cleaning. In the absence of muzzle-stoppers, the men have been in the habit of using improvised stoppers of rag or cork, a practice attended with even greater danger than the use of recognized muzzle-stoppers. The stopper proposed is of a construction designed by Major Bolton, and as it serves also as a sight-protector, it can scarcely fail to be seen should the soldier inadvertently raise his rifle to fire without removing it. The body of the stopper will be steeped in an anti-corrosive composition; and it is to be hoped that all necessity for continual cleaning will henceforth be avoided, a practice which really injures arms far more than any reasonable amount of firing. But as the arms must undergo some cleaning, it is proposed to adopt also an ebonite muzzle-protector, somewhat similar in pattern to that used by many of the volunteers, which will prevent the contact of the cleaning rod with the rifling. The question of powder has been settled by the adoption of some special Waltham-Abbey powder, which is less influenced by damp and less liable to injury by carriage than the present service powder. It shoots rather better than the Curtis and Harvey's powder used during the experiments, and is considerably cheaper. The slings on the new rifle are to be fixed at three places, one at the top band, another in front of the trigger-guard, and the third near the toe of the but. The two upper attachments will usually be employed, but the sling may, for the convenience of the soldier on the march, be lengthened and fixed to the third point.—*Pall Mall Gazette.*

Economic Bridges.

IN a previous number of our journal, we referred to the necessity of reconstruction, and recent deplorable accidents strengthen assertions regarding the importance of replacing many of our cumbersome trestle-bridges by light iron ones. Throughout the country, there is a constant cry for "more bridges." Ferries, together with other inconvenient means of passenger transit, where bridges would be more efficacious, will soon be no longer tolerated. We therefore take for illustration an elegant and economic iron bridge manufactured by the old New-England firm of A. D. Briggs & Co., of Springfield, Mass. The general advantages of the bridge will be easily recognized. It consists of a double series of cords or horizontal ribs, with a series of diagonal and vertical braces or equivalents. By means of these, the strain and tension of the various parts, under a rolling weight, are to a great extent neutralized through the tendency of these parts to distribute such strains, etc., evenly throughout the entire structure. Thus, great strength and rigidity are imparted to the whole bridge, with the use of less material than is ordinarily used in constructions of this character. The connection of the bracing is effected by a form of clamp shown in the annexed cuts (Figs. 1 and 2); this expedites the erection of the bridge, without weakening the main braces. The horizontal cords, of wrought or malleable iron, extend throughout the length of the bridge. They serve to distribute the tension strains, which may be exerted on any part from any point.

The action of a heavy pressure on any part resulting in the depression of the structure, in a vertical plane, can only be accomplished by the elongation of the base line of the bridge. A longitudinal tension and strain are thus created. From this it follows that in a bridge constructed on the principles of the one under consideration, any longitudinal tension will be diffused throughout the whole by means of the horizontal cords relieving that part directly under the weight. Independent lateral play of the bridge is provided against by securing double hooks to the base line of the framings, so arranged, as to their relative positions, as to secure perfect symmetry and the utmost strength, without any complexity in the manner of construction. The design of the bridge, from an artistic point of view, has much to recommend it. The importance of taking advantage of the scope offered for the exercise of artistic talent in this branch of engineering cannot be overestimated. The country might be thus adorned and enriched by iron foot-bridges, gracefully designed; how much more then by bridges built for heavy traffic upon a more extended scale!



TRUESDELL'S IRON TRUSS BRIDGE.

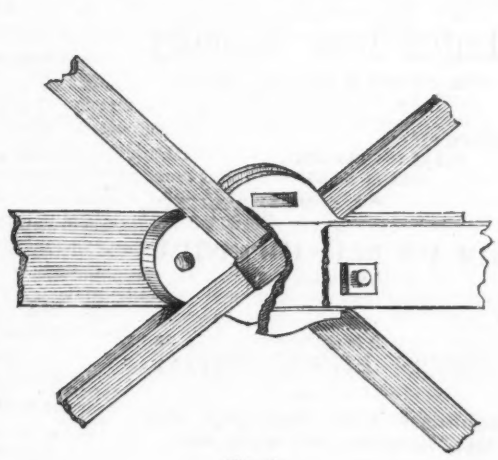


Fig. 1.

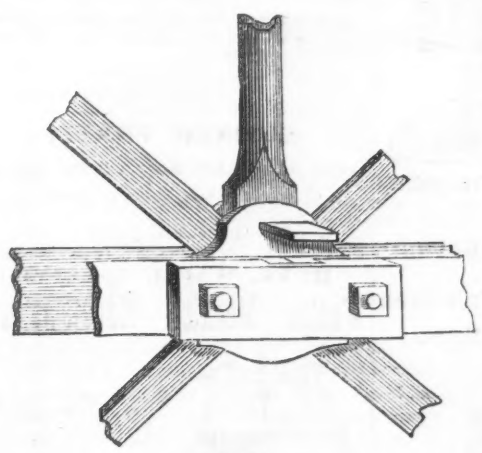


Fig. 2.

A Newspaper Change Abroad.

THE Bavarian Institute of Engineers and Architects is making arrangements for the enlargement of their present very modest organ *Das Notizblatt*, and the alteration of its title to the more dignified one of *Zeitschrift des Bayerischen Architekten und Ingenieur Vereins.* The editor is to be elected and supported by an editorial committee composed of seven members of the institute at Munich and seven belonging to the provincial or branch associations. The Bavarian Government, with that spirit of liberality for all art matters peculiar to continental governments, supports the undertaking in many ways, not the least important of which is a handsome pecuniary subvention annually.

The Welsh Slate Trade.

THE production of the numerous slate quarries of North Wales is estimated, at the present time, to be not far from 350,000 tons annually, representing in money value about $5,622,500, or an average of nearly $15 per ton.

The above produce is made up as follows: Festiniog and surrounding veins, 98,000 tons; Penrhyn and surrounding veins, 109,000 tons; Llanberis, 75,000 tons; Nantille veins, 40,000 tons; Corris veins, 20,000 tons; making a total of 342,000 tons. The number of hands employed, including shippers, men on new works, and all about the quarries or dependent on quarrying, is estimated at 9400. Of this total the Festiniog veins employ 2900; Penrhyn, 2500; Llanberis, 2000; Nantille, 1300; and Corris, 700.

THE Paterson locomotive works are unusually busy just now, keeping nearly 2000 workmen constantly employed in the three different establishments, severally known as the Rogers, the Danforth, and the Grant Works. During the first six months of this year the Grant Works turned out 52 engines, and the other two establishments built about 110, so that Paterson is now turning out engines at the rate of 320 a year, or more than one a day for every working day in the year.

IRON tubes, plugged at their ends with wrought iron, are now used as props instead of timber in mines.

Cornish Pumping-Engines.

BY W. M. HENDERSON, ENGINEER.

This class of engines is especially interesting on account of its superior economy of fuel. The conditions involved by which its preëminence, in this regard, has been attained, may be looked for in the following:

1st. The high degree to which expansion may be advantageously employed.

2d. The unfettered state of the piston, allowing quickness of action.

3d. The saving of steam from loss by clearance and steam passages.

4th. The isolation of the working end of the steam cylinder from the cooling influence of the condenser.

5th. The turning to direct account of the *vis-viva* of the moving masses of the machine. Another source of economy is directly traceable to the use of the "Steam Jacket," an invariable adjunct to this class of engine.

Presuming that the reader is already acquainted with the peculiar construction of the Cornish pumping-engine and its manner of operation, the classified points of merit will next be reviewed. "The high degree to which expansion may be advantageously employed," in connection with "the unfettered state of the piston, allowing quickness of action," is peculiarly adapted to the purpose of pumping water. Steam is admitted at the commencement of the stroke; up to the point of cut-off the velocity of the weight is uniformly accelerated; the momentum acquired, together with the force given out by the expansion of the steam, carries the piston to the end of its stroke, when the resistance and pressure should coincide.

In the out-stroke, the weight of the pump-plunger descends with a constant resistance, and consequently with an uniformly augmented velocity, and the momentum acquired is again stored up, at the end of the stroke, in the steam contained above the piston, to be made available in the return stroke. Now, expansion, if carried to any considerable extent, necessitates the use of a high-pressure steam. Its extended application, therefore, to a rotative pumping-engine, is, strictly speaking, not admissible, owing to the varying speed given out by steam, expanding from a high initial pressure, to the low degree at which the terminal pressure should be brought, having economy in view. Such variation of pressure is highly injurious, especially where the load is not susceptible of acquiring momentum, as is the case, to a considerable extent, in pumping water. From this, it will be seen that a steam-engine, designed for driving mill-shafting or other rotating machinery, where a uniform speed of revolution is necessary, would be entirely misapplied if put to pumping water. In the first case, a uniform speed of fly-wheel is indispensable, while in the latter a uniform speed of piston is required—extremes which can never be produced in connection. As a consequence, then, the fly-wheel must either govern the motion of the pump, or else the pump must govern the motion of the fly-wheel. And the latter, to be of any use at all, must be heavy enough to carry the engine over its centres when running at a low rate of speed. And in order to do this effectively, it must possess so much weight as invariably to make subsecutive the primary object aimed at. It is true the employment of a heavy fly-wheel counteracts, to a certain extent, the varying pressure of the expanding steam; but the succession of shocks given out to the piston by the admission of the steam, and its attenuated power at the termination of the stroke, tells heavily upon the engine, in spite of the fly-wheels' modifying effect. And a tendency to break down can only be avoided by making the engine very heavy, and consequently expensive.

The evil effects of the irregular action of the pump-plunger can also be partially averted by the use of a large air-vessel, a reservoir, into which any excess of water, delivered by the pump when working at its maximum velocity, is stored up, to be given out again when the plunger is at its minimum speed, or passing its centres. The irregularities and internal struggles may be nicely smoothed over to the eye of the superficial observer by the devices just described, but they will nevertheless exist to a damaging extent, and become manifest in due time in the matter of costly repairs and heavy coal accounts.

We now pass to "the saving of steam from loss by clearance and steam passages," and "the isolation of the working end of the steam-cylinder from the cooling influence of the condenser." In the Cornish engine, that end of the steam cylinder where the steam is admitted from the boiler *never* has any communication with the condenser.

Steam, being admitted at the commencement of the stroke, follows the piston up to the point of cut-off; the balance of the stroke is completed by the combined aid of expansion and the momentum acquired by the mass of material set in motion by the first impulse of the steam. On the completion of the stroke, the steam is allowed to pass freely from one side of the piston to the other, producing an equilibrium of effect during the out-stroke. Before the piston arrives at the point of commencement again, the equilibrium-valve is closed, shutting in a quantity of steam before it. It is evident that by means of this cushioning (subject to the nicest adjustment), the loss from clearance and steam ports is rendered practically nothing, if the steam so compressed be equal to the initial pressure. The piston is thus gradually brought to a neutral state at the end of the stroke, when the exhaust-valve opens a communication between the opposite end of the cylinder and the condenser *only*.

This is very different in other descriptions of steam-engines, where, at every alternate stroke, heat is abstracted from the metal of the cylinder by the chilling influence of communication between it and the condenser, which lowering of temperature must be raised again at the expense of the entering steam, a certain quantity of heat passing thus at each stroke from the boiler through the cylinder to the condenser, without contributing in any manner to the performance of work. And this effect is increased directly by a further liquefaction of the steam above that due to loss by expansive working—the very presence of such an additional amount of condensation within the cylinder increasing at once the evil.

The next point to be considered is "the turning to direct account of the *vis-viva* of the moving masses of the machine." It would be paradoxical to suppose that more power could be given out by a moving weight than the original force which created it. And it has been urged that nothing can be obtained from the momentum of the swinging masses of the beams and heavy pump-tree and balance-weights more than a mere return of the force that started them in motion. Such an argument is perfectly valid. And all we claim for the Cornish engine is, that such a return is faithfully made, which is *not* the case with any other description of engine. One of the most important features in the Cornish engine, and on which depends its successful operation, is to proportion the gravity of the moving mass in strict accordance with the point at which the steam is to be cut off; a neglect of this invariable necessity rendered the first Brooklyn pumping-engine a complete and costly failure.

When the steam is first admitted to the piston, the force is much greater than is required to raise the heavy weight of the pump-plunger; consequently a very rapid motion is imparted, and the piston will be carried to the end of its stroke by the acquired momentum, although the steam pressure is not sufficient, near the end of the stroke, to balance its weight; the potential energy is then gradually converted into *actual work*, until the end of its stroke, when it should be entirely exhausted. As a further proof of the advantage of a heavy moving mass, it has been found in practice that "Bull Engines" are invariably inferior in duty to the beam variety, and that the latter description vary in duty in proportion to the amount of metal distributed in the moving parts.

No such advantages as the above can accrue to the rotative engine, for whatever momentum the piston and its connections may possess at the end of the stroke is entirely lost, being expended on the crank-pin, at the dead point, where no pressure whatever could produce any good effect. Neither can any such results be obtained from the variety of direct acting steam-pumping engines, from the simple fact that the steam cannot be used expansively to any thing like the beneficial extent afforded by that principle. The terminal pressure must invariably be fully equal to the load, or the pump will come to a dead stand.

It would be exceedingly difficult in practice to maintain the initial pressure precisely at a certain point, and in order not to fall below it, knowing the consequence, the disposition would be to carry an excess of steam above that necessary to perform the work, which excess of potential energy will be discharged, at each stroke, into the atmosphere or condenser, the engine being high or low pressure.

The last feature of presented economy is to be found in the use of the "Steam Jacket," a casing of cast-iron, enveloping the steam cylinder, having an annular space between the two of about one inch, which space is constantly supplied with steam from the boilers, maintaining the temperature of the metal of the cylinder to an extent, preventing the liquefaction of the steam within the cylinder.

When work is done by expansion, heat must necessarily disappear and manifest itself in a fall of temperature, producing liquefaction. The rate of expansion being duly accompanied by a corresponding fall of temperature, steam becomes liquid in a naked cylinder simply by the heat passing off to the outside air, and the effect is indirectly increased by the extent of saturation produced from expansive working—as moist steam, being a better conductor of heat than dry steam, parts with its heat more rapidly to any neighboring conducting material at a lower temperature. It is not by the addition of a steam jacket that the evil attendant upon condensation by expansion can be averted, as this will necessarily take place from the constancy of natural laws, but the liquefaction will take place in the steam jacket instead of in the cylinder with entirely different results. Condensation in the former case can do no serious harm, for instead of being lost in the condenser and carrying off heat, it is returned to the boilers by a return pipe proceeding from the bottom of the jacket.

From the results of extended practical observation of the duty developed by the various descriptions of pumping-engines, the Cornish stands preëminent for its remarkable economy, the duty in one case having amounted to 130,000,000 pounds of water, raised one foot high, by 112 pounds of coal. Future developments, looking to an increased rate of economy, may be looked for in the possible adaptation of the compound principle applied to the Cornish type.

Joints of Pipes for Gas and Water Mains.

Mr. Barker has described to the Society of Engineers a new joint for pipes, designed to obviate the great loss from leakage with the joints in ordinary use. Mr. Barker uses spigot and faucet pipes, but he casts on them a coarse pitched screw-thread. When the spigot is placed in the faucet, one turn serves to screw the pipes up to a bearing, and at the same time a layer of moist cement introduced into a conical recess is compressed so as to form the joint.

Town Sewage.

We take the following paper on town sewage from the *London Architect*. It is from the pen of Mr. Menzies, an eminent authority upon that subject. The article runs thus:

We seize the opportunity of the recent inquiry at Barking, and the attention drawn to the subject of town sewage by that inquiry, to lay before our readers an abstract of a paper read before the Institute of Surveyors during the course of their late session, by Mr. William Menzies, one of the known authorities on the subject.

The author, after reference to what may be understood by the general term "Sewage," proceeded to consider the subject: 1st, as affecting the public health that attends upon the management of this sewage; 2d, the efficiency and cost of whatever system is adopted for its removal; 3d, the mode of dealing with this refuse when so removed. "The removal of sewage should be complete, continuous, and safe, in all weathers and in all seasons, without injury to the public health; and the sewage should produce, if possible, some return, when applied to the purpose for which nature evidently designed it—namely, the re-fertilization of the earth, from which mankind derive their food. . . . Under the earth system, the human excreta are to be removed from each house in detail, while the other matters included under the name of sewage are to be treated in some manner by drains. Does this system now meet all the requirements of the case? If the excreta alone are removed, what is to be done with the other refuse? It clearly ought not to be poured into the rivers. Being liquid, it must be removed by drains. Moreover, with respect to the excreta themselves, in a town of 10,000 inhabitants, there would be a great many of the upper classes accustomed to the luxuries—it may be said, the essentials to weak and sickly people—of closets up-stairs and over their houses. It is not likely that they would submit to domiciliary visits, such as would be necessary under the earth system; and, as evidently, a law could not be passed compelling the whole community to adopt the earth process, the sanitary authorities in almost every town would have to provide for the management of both an earth and a water system; and it is difficult to conceive how such arrangements could be worked economically, except under some special circumstances. Besides, 10,000 persons would require at least 5000 tons of earth annually, dry and sifted, and there is a great uncertainty as to where this could always be procured." After stating other objections, we are informed that "vast sums of money have been spent in attempting sewage purification by means of different processes, such as by using milk of lime, carbolic acid, animal charcoal, and a vast number of other substances which need not be mentioned; but universal failure followed, and it seemed to have been working against the natural law that vegetation is the great purifier of all refuse, and that living plants shall build up again into some useful and safe shape the polluted matter which is discharged from human dwellings. Any one who has been bred an agricultural engineer and surveyor naturally looks to the fields at once as the only safe agent to be intrusted with this work of useful purification."

The lecturer went on to state what we had been doing in the days gone by, in the matter of our sewage and excreta, adding: "The oldest system is that by which all the rainfall of the streets and houses is conveyed into the same large main drain as the sewage matter; and although London has been drained upon this system, I cannot but dispute its propriety. In any town which has thus been dealt with, a great portion of the road metal used in the streets passes down into the drains; and as the gradients of these drains must be low in England, which is especially a flat country, and has its principal towns situate by the sides of rather sluggish rivers, deposits of the most putrid description, of sand and sewage mixed, are formed at the bottoms of the drains, and decomposition proceeds underneath the feet of the inhabitants, while the foul air, in its most dangerous form, comes back either into the houses of the rich or into the back courtyards where the poorest people crowd together. Neither ordinary, nor indeed any rains, can wash this filth away, as it lies in a clammy mass and constantly chokes up the pipes. It is also necessary to send men in to clean out the drains, and such a system ought no more to be continued than the practice of putting children up chimneys, although it appears that the health of these men as a body does not specially suffer from their occupation. Nothing could be less satisfactory than reliance upon rainfall for flushing purposes, because during long hot dry weather, lasting sometimes for six weeks at a time, when the drains ought to be especially kept clean, it is obvious that the flushing by rain is not available just when it is most wanted. . . Under such a system, the attempt to deal with the discharge at the outlet for agricultural purposes is attended with enormous if not insuperable difficulties. In the first place, the retention of a considerable portion of the sewage in the drains until it is washed out by the rain sends down vast quantities of putrid matter which it is dangerous to deal with in the fields; but, more especially, the quantity is so exceedingly various and uncertain that no possible system can be devised of economical and efficient management. It must always be remembered that the process of utilization must not be one in which we are to have a choice of following it and leaving it alone as we please, but must be complete, perfect, and economical, if possible, both in the fields as well as in the towns, so as to satisfy all the requirements of the case.

"In proceeding to discuss the second system of drainage, that of having very small pipes, only sufficient for the dry-weather flow of the sewage, and providing for the wet-weather

discharge by sending the contaminated mass into some stream or ditch by an overflow, it is more difficult to produce a clear impression. It is obvious that the variations of such a system must be endless, and I would much rather give my opinion of it in the broad terms that, the nearer it approaches in any case to the older system of putting all the rainfall into the same drain as the sewage, the worse it is, and that I would much rather leave you to form your own judgment on its merits after I have endeavored to explain to you the system, which I trust I am not assuming too much in saying that if not for the country generally, at least for the Thames Valley, I may take the credit of having introduced. That system is, that the rainfall shall in all cases, as a principle, be entirely separated from the sewage; the rainfall being conveyed to the nearest outlet, and the sewage to the most appropriate land for utilization. It has come to my knowledge that this system had been spoken of and discussed before I took up the subject, and it is not my wish to detract from the merits of those who advocated it; but on proceeding to investigate the matter, at least twelve years ago, I had never heard of it, and the discovery, if it may be so called, was the result of intense labor on my part. On introducing it to the public notice, in 1865, I found few supporters, and encountered much ridicule. I trust I shall be excused alluding to this, as, should it fortunately succeed, it will probably be stated—as has been to a certain extent already—that it was borrowed from other persons, which, speaking very honestly, it was not.

"Under the system of separation of rainfall from the sewage, the first advantage anticipated is that there will be no gullies or openings into the streets communicating with the foul drains by which effluvium can rise into the streets or court-yards. The second, that men will not require to enter into the drains, to clean out the sand and grit off the roads. The third, that no overflows of foul or sewage matter will be necessary. And the fourth and most important, that the treatment at the outlet by irrigation will be uniform, economical, and practically perfect. The fifth advantage is, that perfect and continuous removal of all sewage may be secured by a complete system of flushing, under command at all times and at all seasons; and it is worth observing that the greatest flushing will be necessary, or rather desirable, in the town in dry weather, just when the fields outside will take it best. The sixth advantage is, that when pumping is necessary, as it is in such a vast number of cases, the economy will be very great.

"The objections that have been raised to this system are, first, that the water off the streets will be so polluted as to be unfit to be poured into a stream; to which the answer is, that the streets ought therefore to be thoroughly scavenged, as it cannot be maintained that any filth is to be left there till the rain washes it away. The second objection is, that it will be enormously expensive to provide two sets of drains. This might be answered at once, by saying that efficiency is the first essential element; but the question of expensiveness is open to full consideration. Every town before it was drained for sewage purposes had a system of surface drains of some sort existing, and the new sewage-drains may therefore be reduced to the smallest size, for removing the sewage alone, instead of being capable of removing sewage and maximum rainfall mixed. I shall allude to this more particularly hereafter, when speaking of the drainage of Windsor, Eton, and Oxford. We must look at the expense of the process from first to last, keeping in remembrance that the whole question is one affecting the rates on the town itself. The last objection is its impracticability. On that point I would merely ask, 'Has it ever been tried?' or, 'Where it has been tried has it failed?'" The author then goes on to narrate lengthily the history of the drainage question in the Thames Valley, and adds: "In July, 1866, I published a pamphlet entitled 'The Present State of the Drainage Question,' in which, after reviewing the whole question, I added: I feel no hesitation, therefore, in reiterating my confirmed opinion that, even where towns are already drained, and the sewage is to be utilized by gravitation, the separation of the sewage from the rainfall is both the most sanitary and economical scheme, and that in all towns where pumping is necessary it is doubly so. My reasons for saying so in the latter case may be broadly summed up thus—that the effect of combining both is, 1st. To necessitate the construction of drains and the erection of power adequate to meet the maximum flow, and thereby to impose, both at first and afterward, great additional expenses. 2d. To dilute the sewage at uncertain periods, and in wet weather to such an extent as to render it comparatively worthless for agricultural purposes. 3d. To divert from the river the rainfall of such an area would, at times, materially add to its volume of pure water; to pollute the whole of it, and considerably to detract from the sanitary results both in the town and in the country. The effects of separating the rainfall from the sewage are, 1st. To enable a certain and well-ascertained quantity to be dealt with, and the consequent erection and maintenance of a power adequate, and no more than adequate, for the purpose. 2d. To obtain a flow of sewage sufficiently incorporated with manurial matters to render it agriculturally useful and profitable. 3d. To discharge into the river, at periods of rain, a body of water falling over an extensive area, comparatively pure and unpolluted, and to insure the diversion of the sewage from the river at all times, and in floods as much as in dry weather."

Various arguments for and against the Earth and Water systems are then entered on. The author adds:

"As to the best method of treatment of the sewage when discharged upon the fields, and the preparation of the land, the question is so large and important that it may well form the subject of a future and special discussion before this Institute. It will probably be sufficient at present to state that my experience and inquiries would, as a general rule, lead me to set aside two thirds of an acre for 100 persons; but if the land could be got cheaply, a whole acre for the same number would probably be better. The land should be laid out in the same manner as water-meadows, or, rather, with a less slope from ridge to furrow, and a mixed system of cropping pursued—changing from Italian rye-grass to roots, and, occasionally, corn crops. The different localities will soon decide what is the best and most profitable system; but the keeping of ewes for early lambs would, likely, be an exceedingly good course of management to adopt, and one which has not yet received its proper share of attention. . . It is necessary that something should be said of the subsoil water under a town, and the method of dealing with it. The great advantages of lowering the level of this water are undeniable, and there are not such strong objections to admitting this as there are to admitting the rainfall into the foul drains; but, at the same time, in all practicable cases, it would be preferable to deal with it in some other way. That must be entirely judged of by local considerations, and the origin of the subsoil water must be traced, before any means are taken for lowering it effectually.

"Under the system of mixing sewage and rainfall together, we have the danger, if not the certainty, of putrid deposits in the sewers, imperfect flushing of the drains, impure air in the streets, large and expensive foul-drains leading out of the town, dangerous storm overflows laden with putrid filth, cumbersome and excessive arrangements to make when pumping is necessary, putrid sewage discharged on the fields, unnecessarily extensive land to lay out for irrigation, and, when taken at all times, as it ought to be, liquid to distribute, that must frequently be not only worthless as manure, but injurious to vegetation—and this profitless labor and expense involved on all hands.

"Under the 'separate system,' it is anticipated we shall have means of dealing rapidly and efficiently with the rainfall, perfect, safe, and continuous removal of the sewage while fresh, cheap and small foul drains, economy at the pumping station, economy in the fields, valuable and comparatively innocuous liquid at all times to distribute on the land, and absolute control from first to last.

"This question and its kindred subjects are, as pointed out by your President in his opening address, of the first importance, and as many members of this Institute will, during the next few years, be professionally engaged in considering them, free investigation will be of the greatest benefit; and I may take the liberty of suggesting the first and most pressing to be discussed is that to which this paper is almost entirely confined—namely: What is the best system of removing and utilizing the refuse of the inland towns of this country?"

The Great Docks Proposed for Bristol Channel.

Two schemes of great importance are now occupying much attention in the mercantile circles of Bristol, Gloucester, and South Wales. The Gloucester and Berkeley canal, sixteen miles long, and of sufficient depth to float ships of 1000 tons, was constructed forty years ago by the two greatest engineers of that time—Upton and Telford. The trade, mainly in timber and corn, has rapidly increased, until now it has overgrown the facilities of the port, having regard especially to the enormous vessels employed in the mercantile navy. Brunel, Harrison, Page, and other eminent engineers, have from time to time been consulted, and have recommended extensions, but all their plans were deemed too costly. Last year the trade of Gloucester was immense, and in consequence of the short time given for the entrance and outlet of ships, and the limited area of the tidal basins there, ships were often detained in Kingroad for weeks. To remedy this state of things, the *Times* states that a plan of improvement has been proposed by Mr. Clegram, the resident engineer, and endorsed by Mr. T. E. Harrison, the hydraulic engineer, for an extension from a point one mile above the present outlet to Holy Hazle Pill, three-quarters of a mile below. It is more than curious that this extension has never been proposed before, inasmuch as by an outlay of £150,000 a new entrance can be provided, with a tidal basin 700 feet long and 300 feet wide; a lock 320 feet long—inside this a dock 2000 feet long and 355 feet wide; and a new communication to the present canal of about 800 feet in length, 150 feet in width at the top, and with a depth of water of 19 feet. Thus accommodation would be given for the largest ships that can navigate the estuary of the Severn from Kingroad to Sharpness. This scheme may, therefore, be regarded as that for the greatest improvement of which the port of Gloucester can at any time be capable. The Board of Trade has been consulted, and it is understood that the president has approved the plan; and as the harbor, in the event of war, would furnish a refuge for gun-boats and a means of repairing them, the right honorable gentleman is believed to be prepared to recommend the Government to make the grant of the necessary capital. The new docks would enable steamers of the largest ordinary class to discharge, and then to turn before leaving; they would avoid in many cases the necessity for swinging ships in the rapid tidal way of the Severn; and as the site is only some four or five miles from the trunk line of the Midland Railway, the docks and the line might easily be brought into communication. In connection with this matter has been revived the great project of bridging the Severn, which, it will be remembered, excited so much attention in Parliament, when, four or five years ago, Mr. Fowler proposed a monster bridge, and an act for its construction was obtained, notwithstanding that the scheme was opposed by all the local and nearly all the railway interests; the purpose was the bridging of the river from Oldbury across the sands to the western shore, a distance of five miles, at an estimated cost of about £800,000. Nothing has been done, either by way for carrying out this scheme or of carrying out another for which an act was also obtained—that for bridging the river at Newnham, some ten miles higher up. A plan is now under consideration for constructing a sub-way from the western shore to near the contemplated new docks. This would materially shorten the distance between London and the Dean Forest and the South Wales coal-fields; and the result of a recent survey is that by the construction of the new docks and of the sub-way, or of an equivalent bridge, the Government mineral and wood-land property in Dean Forest, 25,000 acres in extent, would be improved to the value of £40 an acre, or, in all, £1,000,000 sterling. The cost of the sub-way is set down at £250,000—a mere trifle when contrasted with the enormous cost of the gigantic bridge at Oldbury, which would be the largest in the world, and not greater than the cost of the Newnham bridge. The present scheme would be far more efficient than either of the other two; for it would connect the South Wales and Midland systems, and would afford a constant export trade in coal and iron from the contemplated docks at Hazel Pill. Last year shipping representing between 200,000 and 300,000 tons left Sharpness empty to seek cargoes in South Wales. If the docks are constructed and the subway is made, ships will be enabled to load at Hazel Pill, and the consequent improvement in the value of the Forest of Dean coal-field will be enormous. It is therefore understood that the Office of Woods and Forests is prepared to recommend a loan of £250,000 for the construction of the sub-way. The Gloucester and Berkeley Canal Company will meet within the next few days to decide whether they will apply to Parliament for powers to carry out as much of this great work as they are immediately interested in.—*Engineering.*

The Reese River District.

To the Editor—Sir: Having got safely thus far from Austin, let me stop, take breath and look back, collecting my thoughts about it. Austin and the Reese River District are "played out," they say. Begging their pardons, there are several reasons for disagreeing with that opinion. Yet it is one of those cases in which the prophecy helps to fulfil itself. When people out here think a place will soon collapse, they make haste to leave it, and then it frequently does collapse. But there are a good many people left in Austin yet; and the mines—that is, the two which are vigorously worked—show no signs of exhaustion. On the contrary, the deepest workings in theLane and Fuller (Buel North Star, or some other ledge, believed to be the Buel North Star) display a magnificent body of ore, the like of which has rarely if ever been seen in Lander Hill; and the workings of the Manhattan Company from the Oregon shaft contain reserves of some six thousand tons of quartz, enough to occupy the Company for a couple of years. Much of this is first-rate ore, and the character of the whole will be soon ascertained. These mines are both some five hundred feet below the surface, and it may reasonably be expected that they will be less troubled hereafter by the heaves, breaks, and irregularities which have always rendered mining on Lander Hill so costly and precarious. The imperative necessities of the moment are, I think, the following:

1. A careful and thorough instrumental survey of the workings, not only of these two mines, but of all others in the hill that are still accessible, and especially with reference to the slides, cross-courses, and breaks in the granite, by which the veins have been dislocated. The evidence of these things is in old drifts and shafts, fast going to ruin; and it would be invaluable as a guide to future exploration and exploitation.

2. A consolidation of titles by compromise, purchase or union, until all danger of further disputes is removed. Several patents have been granted by Commissoner Wilson to Reese River mines; and I should not like to say what will be their legal effect. It is a matter of considerable importance, for instance, whether the surface granted is hereafter owned in fee by the patentees. If so, it will make trouble. If not, the patent is absurd, and confusion will hereafter result from it, when other parties, claiming upon other veins, apply for patents covering the same ground. Mr. Wilson succeeds admirably in making matters worse where they were bad enough. The only remedy that I can see, until the law is amended, is in the wise adjustment of conflicting titles by the owners themselves. And this is necessary for another reason. Only strong companies, with plenty of ground, can be permanently successful in this district. Small proprietors will make money, perhaps, for a while, on a rich chimney of ore: but they are likely to lose it all in trying to find another. It has been observed, that, from the beginning, while the Lander Hill mines have been subject to extraordinary fluctuations, there has never been a time when some two or three were not in *bonanza*. Now, if a few companies, instead of many hundred, had operated on this hill, their costs of administration and exploration would have been greatly reduced, and their success would have been so averaged as to be uniform. I am happy to say that the process of consolidating neighboring claims is rapidly going forward among the Comstock mines, and I look for the best results from it.

3. The location and execution of a deep tunnel (say from Clifton), under Lander Hill, in the interest of the present mine-owners or their successors, not of a new party of specu

lators. In the broken and faulted condition of the Lander veins, such a tunnel might locate and control every vein it cut, almost without fear of a subsequent identification with any of the surface locations. The result would be a further splitting up of ownerships, and probably no good to any body. The tunnel must be run in the interest of the mines.

4. Cheaper labor. The mere cost of extracting ore at present rates ranges, in the best managed mines, from $15 to $50 per ton and upward. Probably $30 would be a fair average. Under such circumstances, the amount of money spent in dead work becomes frightful; and it is no wonder that even the best mines pay comparatively small profits. Curtis, of the Manhattan, and the Lanes, of the Lane and Fuller, have managed really good mines with extraordinary skill and prudence. The result has been profitable, but by no means satisfactory, when one thinks of the money that might be made from such ores. The dividends have gone largely into the pockets of the common miners, who receive $4 per day in gold, while Chinamen could be hired to do the same work (with single drills and giant-powder), at a saving of 60 per cent. The difference last year would have been more than a million dollars in Central Nevada alone—quite a pretty sum to distribute in dividends. The employment of Chinese labor has been much agitated since my last year's tour, and matters are coming rapidly to a head. Nothing can stop it now but timely concessions from the miners, which they are not wise enough to make. Chinamen are working successfully at Silver Peak; they are about to be introduced into Morey District; and I think they will be employed in Reese River District before another year has passed away. Labor has tyrannized a good while in this region, and capital has seemed to be at its mercy; but there are more sense and vitality of perseverance in our capitalists than they have received credit for; and, above all, they have a motive for perseverance, which the miners have not. Capital once invested in a given locality is bound there—it cannot pick itself up and "stampede" to some better place. The miners, however, go from camp to camp, as suits them best; and when capital shuts the mines in a community devoted exclusively to that industry, labor must go elsewhere. Whenever the capitalist makes up his mind to the issue and puts it decisively, there can be but one result. It is not necessary to have violent conflicts. Stop the mines until the miners are gone, and then bring in the almond-eyed, cleanly, docile, industrious, cheap Orientals. I shall give you some heavy doses hereafter, in all probability, on this Chinese question. It is now generally admitted that China crockery and China cooks do not exhaust the catalogue of possibilities. If politics and incendiarism were out of the case, it would be settled in a week, and the decent white men would be all the better for it. It is only poor workmen, not deserving the name of skilled miners, who need fear the competition of the Chinese. *Their* wages would come down, as they ought to. Men of real skill and desert would be better paid than ever. With ten mines at work where we now have one, the men who are now drudging at $4 per day, and carrying, through the ingenious mechanism of Leagues and Unions, the dead-weight of all their shiftless comrades, would be in great demand as foremen and mining captains. But they "cannot see it," and they are still blindly doing their best to hasten what they fear. A curious fact it is that Cornishmen and Irishmen, themselves exiles, are the foremost to persecute the Chinese. The following irritating comparison, addressed to a gentleman from St. Just, is not mine, but it makes a forcible quotation: "What's the difference between you and 'John?' You came over the sea, and so did he; you steal specimens, and he steals chickens!" R.

VIRGINIA CITY, NEVADA, July 10th, 1869.

Ships' Lights.

M. TRONSENS has made a communication to the Paris Academy of Sciences, in which he suggests a new arrangement of ships' lights to prevent collisions at sea. He proposes, says the *Mechanics' Magazine*, the use of three lights, arranged in the form of a right-angled triangle, one side of which is to be vertical and another parallel with the medial line of the vessel, and toward the head, and placed in the highest possible position; the light at the summit to be of a different color from the other two, and the distance between the lights to be about 18 feet. Observation of the two lights in a vertical line will, says the author, furnish an approximate notion of the distance from the ship, and by comparing the apparent distance of the two lights on the horizontal side with that of the two on the vertical side, an idea of the ship's route may be obtained; at any rate, the relative distances will show whether that course is to the right or left of the line of observation, which is the main fact to be ascertained, and that without the aid of any instrument being required.

Curious Discovery.

A PAPER was recently read before the American Association for the Advancement of Science, which stated that on the southern shore of Lake Superior, in Marquette County, Wisconsin, were found remains of long canals and dams, constructed by the beavers for the purpose of transporting their cuttings, consisting of trunks of trees two or three feet long, from the places where trees had fallen, to their lodges. Some of these canals were three, four, and five hundred feet long. They were generally three feet wide, with an average depth of three feet. In order to maintain a continuous depth of water, they made dams at certain distances, and followed the Chinese plan—to whom the lock was unknown—of drawing their cargo from one level to another.

On the Laws Governing the Flow of Steam Through Exits.

BY P. H. VANDER WEYDE, M.D.

AFTER De Pambour had proved that the chief cause of the difference between the pressure of steam in the boiler and upon the piston, was in the motion of the latter, and the consequent motion of the steam through the conduits, and finally the resistance this steam met with, in passing through these conduits, attention was drawn to the calculation of this resistance. A certain branch of pneumatics which thus far had only been looked upon as a mere theoretical curiosity became at once of the utmost practical value.

The law governing the exit of fluids from openings was discovered by Toricelli. He proved that the velocity with which fluids flow from openings at the side of a vessel is equal to the velocity a body would acquire when falling freely from the surface of the liquid to the level of the opening. Let us illustrate this by an example: Suppose we have a tank of water 16 feet high, with four openings, one at the bottom, the next 4 feet high, another 8, and the uppermost 12 feet high, and 4 feet below the surface of the water in the tank.

In accordance with the laws governing the motion of falling bodies, as laid down in text-books on natural philosophy, it is known that bodies falling through the heights of 16, 12, 8 and 4 feet will respectively have acquired velocities of very nearly $8\sqrt{16}$, $8\sqrt{12}$, $8\sqrt{8}$ and $8\sqrt{4}$, or of 32, 27.7, 22.6 and 16 feet per second. Toricelli proved that in this case these numbers would represent the velocities with which the water would flow out of the different openings, provided the surface was by means of a proper supply kept at the same level. This is, indeed, the principle on which the amount of water discharged can be easily calculated, since when knowing the sectional area of the exit in square inches, and the velocity of the current in inches per second, we have only to multiply these two numbers together to find how many cubic inches are discharged every second.

Elastic fluids, like confined gases and steam, follow in this respect the same law as liquids; only we have to make a previous calculation of the height of a homogeneous column of the gas in question, which would exert the same pressure at the opening, as the confined gas does. This is easily found from the weight of a cubic foot of the gas, and the known pressure under which we have confined it. Let us take air as an example. Suppose we have a vacuum, as nearly perfect as practicable, which is, in the case under discussion, as good as a perfect one; and we wish to determine how rapidly the air will enter it through an orifice. We have only to find the height of a column of air of uniform density exerting the same pressure as the atmosphere, and then also the final velocity of a body falling unimpeded through this distance. Taking the pressure of the air at 15 pounds per square inch, and the weight of a cubic foot 0.08 pounds, its pressure on a square foot will be 144×15, or 2160 pounds. The height, therefore, of a uniform column exerting the same pressure will be $2160 \div 0.08$, or 27,000 feet. The final velocity of a body falling through this distance will be very nearly $8\sqrt{27{,}000}$, or 1313 feet in a second. This number represents quite accurately the velocity with which air will rush into a vacuum.

Let us now see what influence an increase of pressure will have upon this velocity. Suppose we have the air under a double pressure of 30 pounds per square inch; then, in accordance with the law of Mariotte, it will possess likewise a double density, and thus weigh 0.16 pounds per cubic foot. The height of an air column of this density exerting the same pressure will be found, according to the rule first explained, to be $144 \times 30 \div 0.16 = 27{,}000$ feet, the same as before; the final velocity of a body falling through this height being of course 1313 feet per second.

Suppose we have air under half the usual pressure, or 7.5 pounds per square inch. Its weight per cubic foot will be one half what it is under its normal pressure, or 0.04 pounds, and the height of the air column required will be $144 \times 7.5 \div 0.04$, or again 27,000 feet; the final velocity of the falling body being 1313 feet per second. In all three cases, the air will flow into the vacuum with a velocity of 1313 feet per second.

We come, therefore, to the remarkable conclusion that air will always rush into a vacuum with a velocity of nearly 1300 feet per second, whatever may be its density in the vessel from which it escapes, since the calculation of the height of the homogeneous column of the same density and exerting the same pressure as the air in the vessel is always the same. It is at the same time evident that a difference in temperature, which will change the pressure of confined air, without changing its weight per cubic foot, will influence this velocity, and make it larger or smaller, according as the temperature is higher or lower.

If we take a gas lighter than air, we have a different result; for instance, hydrogen, which is some fifteen times lighter, under the same pressure, gives us for the homogeneous column under common atmospheric pressure $144 \times 15 \div 0.0053$, or 405,000 feet; a body falling through this height will attain a final velocity of $8\sqrt{405{,}000}$, or nearly 5090 feet per second. If we calculate the velocity of heavier gases, we will find it lower, and in general we find that these velocities are to one another inversely as the square roots of their densities or specific weights; for instance, that of hydrogen is to that of air as $1:\sqrt{15}$. As steam at 212° Fahrenheit has a pressure nearly equal to that of the air, with half its density, its velocity when escaping into a vacuum will be to that of air as $\sqrt{2}:1$, or $= 1300 \times 1.41$, or nearly 1833 feet per second.

Let us now see what will be the velocity when a gas or vapor does not flow into a vacuum, but into a space filled with a rarified gas. A consideration of this subject is of great importance, as it will teach us the rapidity of the discharge of steam into the air, or into the condenser, in which latter place a perfect vacuum can never be made. All we have to consider here is the difference in the two pressures, and then to calculate the height of the column, the pressure of which would be equal to this difference, and of the same density as that which exerts the strongest pressure. Suppose we have air of half the atmospheric pressure and wish to find the rapidity with which air of the full pressure will flow in. The difference in pressure between the two being 7.5 pounds per square inch, we find the height of the column to be $144 \times 7.5 \div 0.08 = 13{,}500$ feet, and the final velocity of the body falling through this height to be $8\sqrt{13{,}500}$, or 930 feet per second. It is evident that it would not do to calculate the velocity of each of the gases in escaping into a vacuum, and to subtract these velocities in order to find by their difference the velocity of the gas possessing the strongest pressure, since for the same gas under the same temperature these velocities have been proved to be equal. In the case considered here, the velocity of the air at the ordinary atmospheric pressure, when flowing into a vacuum, being 1300 feet per second, and its velocity under one of half the pressure being also 1300 feet, their difference in velocity is 0. This rule would inform us, therefore, that air of the common pressure would not flow at all through an opening into air of one half or of any other fraction of the normal pressure; which is utterly absurd.

But this error has been made quite recently by the *London Engineer*, in an article on "The Flow of Elastic Fluids Through Orifices and Pipes," and possibly many of its readers, through lack of previous instruction, may be misled by it.

City Improvements.

THE three great material reforms of which the city of New-York stands in need are improved dock accommodation on both river fronts, a regular and scientific system of drainage, and rapid communication between the centre, the extremities, and the outlying suburbs of the metropolis. The piers and wharves have long been a subject of reproach to this great city. The material of which they are composed and the manner of their construction are simply barbarous by comparison with the docks of Liverpool or any other leading European port. Yet there is no obstacle to rendering the shore front of New-York accessible and convenient along with being ornamental. As it is, there is neither convenience in the approach to nor ornament in the appearance of those rotting and unsightly structures that protrude themselves at either side into the North and East Rivers. As a commercial entrepôt, there is no spot in the world so well adapted for such purpose as the island on which New-York is built; yet, with a most infatuated blindness, the dock front is allowed year after year to become more and more an obstruction to the commerce of the city, and what might have been simply and cheaply done at one time will finally, when an overbearing necessity demands it, be accomplished only at great inconvenience and expense. The drainage of the city is another subject that ought to receive, perhaps, just as much consideration, as it affects both the daily comfort and the physical health of the people. Every body knows that New-York is ill-drained, and that every tide that rises penetrates the land on which the city is built through irregular channels that were never properly filled up. Then, again, the question of rapid urban and suburban communication comes up, and certainly commands as much interest as any subject of a local character. It would hardly be an exaggeration to say that quick travel from one end of the city to the other would, on the score of importance, receive ten times as many votes from our citizens as either of the other questions concerning improved drainage and dock accommodation. Now, however, is the time for making a genuine effort to accomplish all three reforms. Of course, any period before this would have been still better, but now that we are afforded a clearer view of the wonderful future toward which this city is tending, and of the imperative necessity to make provision for the vast wants it will ultimately demand, it is folly to postpone improvements that time will inevitably force at enormous but inevitable sacrifice.

Every year adds its millions of increase to the business of New-York merchants. New palaces of trade and industry are rising up on every hand, and so it will go on. Capital will continue to seek here an investment and labor its reward, and a few years will find a city rivalling in population, opulence, and splendor any city of ancient or modern times. If there are those who doubt it, let them look back at the progress of the city for the last forty years. In 1826, the number of inhabitants was 150,000, and the estimated value of taxable property $100,000,000. In 1856 the number of inhabitants was 700,000, and the value of taxable property was $500,000,000. In this year of grace the census would give us over a million of inhabitants, and of taxable property over a thousand millions of dollars. Where will we be thirty years hence?

THE PIERS AND WHARVES.

General Egbert L. Viele, the Engineer of the Park, who has given twenty years of his life to the study of the topography, hydrology, geology, and general conformation and improvement of Manhattan Island, has also turned his attention to the work of reconstructing the shore front of the city, of making communication easy and rapid between the central or business portion of New-York and its suburbs, and of perfecting the drainage of the soil. The Park is the open and lasting volume that proclaims his genius as an engineer, and therefore it is that his suggestions in reference to the remodelling of our dilapidated dock system carry a weight of no

ordinary character. At the instance of Mr. Joseph W. Duryee, General Viele prepared a plan upon which all the piers in both rivers should be modelled. The pier piles should consist of cylindrical columns of cast iron, three feet in diameter in the clear, and one and a half inches in thickness, in sections of nine feet in length, provided with flanges on the inside, by which they are bolted together on the top of one another until the desired length is obtained. The lower cylinders are to be clamped on the inside of the lower edge down to about a quarter of an inch in thickness, and are to be driven by the pneumatic process until they reach a rocky or other firm substratum, and the head of the column is in the same horizontal plane. The longitudinal distance between the piles should be twenty feet and the lateral distance ten. Skewback girders of rolled iron, twenty-three feet in length, laid end to end longitudinally, firmly secured and bolted, also secured to the head of the piles, shall be laid the full extent of the pier. Brick arches of hard burned bricks should be turned between the girders, laid in hydraulic cement and covered with asphaltum, upon which shall be laid eighteen inches of clean, sharp sand to receive the pavement of concrete or stone. The piles should be carefully and thoroughly filled with a concrete or beton of best hydraulic cement and broken stone, each piece of which shall pass through a two-inch ring. Between the piles should be constructed a framework of diagonal and horizontal bracing, composed of oak timbers twelve inches by twelve. The outer horizontal timbers to be sheeted with two-inch oak planking, bevelled and secured to the backing-piece, which should be of oak not less than one foot square. No spikes to be used less than half an inch square and twelve inches long.

If all the piers were thus constructed, New-York might be pronounced the finest port in the world for the accommodation of vessels in loading and unloading. Liverpool, in this regard, would not be quite so convenient, the time consumed and the trouble caused in entering one of her ponderous basins by a large merchant vessel being one drawback, and the frequent difficulty of finding a place close by the pier to discharge cargo being another.

Had Baron Haussmann, the magician of Paris, the means and the absolute power to reconstruct our river front, he would give us a grand boulevard all around the city, with handsome and commodious piers projecting therefrom, abundance of room for wagons and passenger-cars in the middle of the street, and a broad, ample pavement, where the thousands might promenade on sultry summer evenings who are compelled to live in the hot air of illy-ventilated tenement-houses. We can only dream of such a happy consummation now; yet not far distant in the coming years it is possible such a result may be accomplished. The Park came into existence from more unlikely materials.

RAPID CITY TRAVEL.

This is the eager desire of the New-York mind, increasing in intensity from year to year. The underground railroad has been time and again suggested as the only possible relief that can be afforded to our overcrowded thoroughfares; but there is a wide difference of opinion as to its being the best and only means of securing the desired end. Some time ago the merits of the tunnel and the arcade railways underwent a long and critical discussion in the press. The latter captivated a great many minds, and really appeared to be the best suggestion ever offered for relieving Broadway, and affording rapid transit to travellers. But the fierce opposition shown to it by property-holders on the great thoroughfare caused it to be abandoned, and nothing has been heard of it since. The tunnel-road would require almost as long to complete, if started from the Battery on an even grade, as that of Mont Cenis, and the expense would be something fabulous. General Viele made a report on both roads, the tunnel and the arcade, giving the palm to the latter as infinitely the easiest, least expensive, and of more ample accommodation. The failure of the one he recommended did not, however, discourage him from thinking over another plan which would entirely avoid the objections advanced against the arcade line.

His present idea is that an elevated railroad, girdling the city on the bulkhead line, will answer the requirements demanded of capacity and rapidity, safety to life and health, least injury to property, and convenience. He proposes to build a road along the river front thirty feet wide, supported on iron pillars four deep, and running along the whole extent of the bulkhead by the North and East Rivers, communicating with the principal railroad depots—two tracks for through and two for way passengers, with stations at intervals of every ten blocks. This road would in no manner interfere with any of the ferry-houses or steamship fronts by the water, but would run past them and present an ornamental exterior to the street. The plan is a good one, and deserves consideration. The elevated road in Greenwich-street, called by practical engineers the "crutch railway," is pronounced unsuitable for safe and permanent travel by reason of the feeble support on which it rests. Cars oscillate on its track and make passengers feel decidedly uneasy.

CITY DRAINAGE AND STREET SEWAGE.

The evil of defective drainage with us is greatly increased by the so-called city improvements, or grading of streets and avenues.

To properly understand the position assumed, it is necessary to bear in mind that the topography of the island of New-York varies from five to one hundred and fifty feet above high-water mark; that between these two limits there is every variety of surface. In some sections the topography is of the most intricate description—abrupt ledges of rock, deep and narrow valleys, sudden upheavals and contortions of the geological formations. Winding along this varied surface, in every direction, are the original drainage-streams, one of them of such an extent that it was formerly used for mill purposes.

Now, in laying out the city, the rectangular system of streets and avenues has been adopted, no reference whatever being made to the original topography of the island. The consequence is that the grading of the streets, especially in the upper part of the city, consists of deep rock excavations and high embankments, some of them as high as forty feet. These embankments cross, of course, the old valleys of drainage, through which flows the drainage-stream of a large area. In most instances, a few stones are thrown together and called a culvert, for the purpose of letting these streams pass under the embankments. A few months suffice to destroy these culverts for the purposes of conductors, and the embankments soon become permanent dams, causing the collection of large bodies of water all over the island, which in midsummer become stagnant pools, breeding pestilence and disease. Whenever it becomes desirable to improve the lots adjacent to these embankments for sale or building purposes, earth is dumped in to absorb the water, which is none the less present because it is not seen. The soil becoming saturated forms a sort of sponge, through which the water ascends by capillary attraction, giving out a constant miasma, no less fatal to health than the stagnant water which it replaced.

Any system of sewerage, no matter how perfect, would not be a remedy for this evil, for the sewers are but ten or twelve feet below the grade of the streets, while, as has been stated, in some instances these streams are forty feet below the grade of the streets, being thirty feet between the bottom of the sewer and the water of drainage. Furthermore, within the corporate limits of the city, more than seven hundred acres have been filled in where the tide once flowed, and the material of this filling has generally been the worst description of earth for such a purpose. The fearful ravages of epidemics in these portions of the city are sufficient evidence of their insalubrity. Commencing at the Battery and following the original topography, we find that previous to the year 1695 an inlet, and subsequently a canal, ran through what is now Broad-street, as far as Exchange-place, with a branch running toward the west through Beaver-street, afterward known as the Old Ditch. The main canal was crossed by two principal bridges, one at where is now Bridge street, and the other at Stone-street, while at Beaver-street there were two smaller bridges for foot-passengers. The Long Island ferry-house stood at the corner of New-street and Exchange-place, the ferry-boat passing through the canal.

A little further north, a stream ran through what is now Maiden Lane. Next above, where is now Ferry-street, was Beekman's Park, a large tract of wet land, from which a stream ran into the East River. Next was the Collect Pond, a large body of fresh water, said to have been seventy feet in depth, located in the basin, the site of which is now occupied by the Tombs. On this small lake, Fitch launched his first steamboat. A stream called the Wreck Brook ran from the Collect to the East River, through a low meadow; it emptied into the river at the foot of what is now called Roosevelt-street. There was formerly a bridge across this on the old road, which is now Chatham street.

The main outlet of the Collect was by a stream running to the North River through the Lispenard-swamp, which covered a very large surface, extending from Duane-street on the south to Spring-street. A large stone bridge crossed this stream at Canal-street. In the year 1796 a project was submitted by two engineers to the city authorities for making a dock or basin of the Collect as a safe harbor for shipping, and to drain and carry off the water from that quarter by means of a ship-canal. This shows what an extensive affair this body of water was. It is generally supposed that when the city is built upon, all the water will disappear, but such is not the case.

The very material which is thrown in to cover it up will form a nucleus for its increase, not only retaining a larger amount of moisture, but will have added to it the drainings through the animal and vegetable refuse which accumulates in all large cities. The consequences which we have already felt are trifling, compared to the suffering that will follow the entire occupation of the island. The older cities of Europe give us sufficient evidence of this. They pursued the same course which we are following, and what has been the result? Take, for instance, the city of Glasgow; for five years ending 1840, 55,949 persons were attacked with fever—every fifth person in the city; out of these 4788 died. We know not at what moment, under a combination of unfavorable circumstances, a pestilence may break out among us; every thing is ripe for it, and so sure as it begins, so sure will it follow the water-lines.

The remedy to be applied in the lower part of the city is to widen the narrow streets and to raise the grade where the streets pass through the original depression of the surface. Narrow streets under any circumstances are a curse to a city. They are too generally the abodes of vice and crime; in them an ordinary sickness spreads into a pestilence, and a fire into a conflagration. They are always filthy in summer, and frequently blocked up with snow in winter. They are not fit for business purposes, for they stifle commerce; nor for residence, for they breed disease. Wide streets, on the contrary, are more healthy and cheerful for residences, and more useful and valuable for business purposes. There is less danger from fire, as the flames cannot spread across the street. They are cleaner in summer, and are never impassable in winter. By constructing lateral drains along the slope of the depressions in the lower part of the city, and connecting them with the sewers, they will intercept the water in its descent and prevent its accumulation in the original basins, and then raising the grade, at the same time widening the streets, and perhaps discontinuing some of the short and insignificant streets in the Sixth Ward, the health of the city will be improved one hundred per cent. So far as regards the upper part of the city, it is absolutely necessary that some system should be adopted for the free flow of water along the channels of the original drainage-stream. This can be done by building more substantial culverts beneath the streets, and by the construction of permanent drains, so built as to admit of the percolation of water through the interstices of the covering. These drains should be excavated to a firm substratum, and every property-owner should be compelled to construct of a uniform character that portion of each drain which may pass through his property.

Let us hope that the time is coming when we shall do some credit to the higher intelligence and broader philanthropy which characterize the age in which we live, and shall adopt those measures which are so clear and so imperatively necessary, if we would avoid the want, and woe, and wretchedness which form so many black phases in the history of the cities of Europe. In this money-making, money-wasting generation, let us not be deaf to the lessons of the past. And while we are erecting our marble palaces of trade, rearing our domestic altars in gilded and frescoed halls, and seeking heaven with the spires of our gothic temples of religion, let us not forget that more than all this splendor surrounded the thrones of the Cæsars, and yet Rome fell under the combined influences of a lawless democracy and the malaria of the Pontine marshes.

In her history we may read our future, unless we learn wisdom by her experience.

General Viele proposes that a low, level sewer of brick, built in a coffer-dam, be laid along both river-fronts, by the bulkheads, to receive the drainage of the sewers, and meeting at the Battery be run out in a tunnel to the tidal channel, thus entirely relieving the shores of the island from the noxious and offensive matter that is forever floating up and down by the piers at either side.—*New-York Times.*

Improvement in Voltaic Batteries.

A NEW battery for telegraphic purposes, but which may perhaps be generally useful, has been invented by M. Guyot, and apparently is not unlike the ordinary Menotti sand battery. It consists of a porous earthen vessel filled with finely-powdered iron ore, in which is plunged a cylinder of gas-retort charcoal and an ordinary vessel filled with concentrated solution of common salt, in which is placed a slip of zinc. The only care required to keep such a battery in order is to keep the latter vessel always full of concentrated solution. Further, the solution may be replaced by sand impregnated with it, or by salt in crystals, the humidity of the atmosphere being always sufficient to serve as a solvent.

Cement for Bottles Containing Volatile Liquids.

Chemists who have used a luting of melted sulphur for sealing bottles containing ether, benzole, bisulphide of carbon, and other volatile liquids, will find it much more convenient and quite as effective to mix finely-ground litharge and concentrated glycerine, and apply the mixture as they would paint around the cork or stopper. The coating soon becomes extremely hard and air-proof, but it can be easily removed with a knife.

Queries.

S. R. M., OF N. Y.—If you apply your own definition of a foot-pound, that it is the force necessary to raise one pound one foot high, to the case of the revolving-wheel of four pounds, you will see that the force driving it cannot be measured by foot-pounds, as nothing is raised one single foot, not even one inch, one side of the wheel balancing the other.

G. S., OF ILL.—What you call a simple barometer—namely, a glass tube with one dime's worth of pulverized gum camphor, filled with water, and sealed—is no barometer at all. In the first place, the camphor is very nearly insoluble in water (1 part in 1000 water), so your dime's worth of camphor would always remain at the bottom. But the liquid used is alcohol. In the second place, this arrangement is called the camphor storm-glass, and has been proved to be utterly worthless as a weather-indicator. It is only acted upon by changes of temperature, and is therefore a rude kind of thermoscope, far inferior to the thermometer. Cooling some portion of the instrument with ether causes at once a deposit o crystals on that place, and proves that heat and cold alone caus the changes.

J. W. R., OF N. J.—Glass is not the best article you can use for breaking the electric current. Paraffine has been proved to be the best insulator, next is vulcanized rubber; then come shellac, resins, sulphur, silk, etc. The smooth surface of glass permits, sometimes, the escape of electric-charges; some kinds of glass, principally those containing an excess of soda, will attract moisture, and thus be very bad insulators. They are, however, improved by covering the surface with a coating of shellac dissolved in alcohol. It is advisable to take this precaution with any kind of glass, if we wish a perfect insulation, or break of the electric current.

S. K., OF NEV.—Desires a remedy against bed-bugs. The latest we have heard of is this: Close the room tight and burn sulphur in it until well filled with the sulphurous acid fumes. Repeat this twice in twenty-four hours, and then finish up with the evolution of ammonia from lime and sal-ammoniac, so that the sulphurous acid that has penetrated into the cracks may be saturated, and a sulphate of ammonia formed. It is certainly a very scientific method, and is worth trying, as it is claimed that the fumes will destroy the eggs of this vermin, wherever they reach them.

The Iron Age of Ship-Building.

The first large square-rigged iron sailing-vessel ever built in this country was successfully launched August 5th, from the yard of Messrs. Harlan & Hollingsworth, at Wilmington, Del. This vessel, a bark, was built for Messrs. Tupper & Beattie, of this city, and is said by competent judges who have examined her to be in every respect equal to the best Clyde-built ships. She registers 700 tons, new measurement, is 155 feet over all, 140 feet keel, 31 feet 9 inches beam, 11½ feet depth of hold, is 7 feet between decks, has all the modern improvements, and is very appropriately named the *Iron Age*. She has a yacht stern, upon which is placed the attractive and appropriate coat-of-arms of the State of New-York. Her prow is sharp, and has for a figure-head the bust of an artisan with a cold-chisel in one hand, and a hammer in the other, emblematic of his craft.

This vessel was built upon British specifications, and at a cost, we are assured, not exceeding the best Clyde-built ships, or indeed the cost of constructing a first-class wooden ship at this port at the present time, a special contract rate having been secured. In several essential particulars, the *Iron Age* is an improvement upon any British iron ship which has visited our ports. The angle iron used in her construction is considerably heavier than that employed by the Clyde and Mersey builders; her ribs are from two to four inches closer together than British ships, while in her framing there has been no piercing or bursting of rivet-holes, which is something unusual in this class of vessels. In point of model, sailing qualities and carrying capacity have been judiciously blended. All the British iron ships that we have seen are long and narrow, thus rendering it necessary to ballast them before receiving and after discharging cargo. The *Iron Age* has sufficient breadth and curvature to obviate such a necessity. She has already been surveyed by the agents of the American and French Lloyds, and pronounced by them one of the best specimens of iron ships. When launched and ready for rigging, her draught of water was only four feet eleven inches forward and six feet aft, which is a foot lighter than a wooden ship of the same dimensions.

While the first cost of an iron ship is greater than that of a wooden vessel of the same size, the former, in the end, is much the more economical. It has been abundantly demonstrated that the use of iron instead of wood gives to the vessel greater strength, combined with lightness—two important considerations in ships. An iron ship, moreover, is not subject to the intense straining which is so severe upon the joints of the wooden vessel. The facility which iron gives in the construction of a vessel is much superior to that of wood, because there is no useless metal employed, and no filling is required. The power of iron to resist tension and compression is also much superior to that of wood. In the preparation of the material for the construction of a vessel, there is great economy of time and labor in the use of iron. The superior strength of iron vessels, and the tenacity of their frames in contingencies fatal to wooden vessels, are illustrated by a long practical experience. The use of iron increases the capacity of the vessel for stowage, thus rendering this kind of tonnage far more profitable, to say nothing of durability. A first-class wooden ship will rate A 1 for but nine years, while a first-class iron ship will stand the same rate for twenty-one years. And the iron ship, with no unforeseen casualty, will be good property long after a modern wooden ship has gone out of existence.

The days of wooden ships, it is safe to conclude, are about numbered. In Great Britain, iron has become the standard material for ship-building, and in other maritime countries a similar change is beginning to take place, so that, in another decade, probably, wooden ship-building will be out of date. Although the United States, for obvious reasons, is behind the leading nations of Europe in this branch of industry, it may safely be taken for granted that we are not likely to remain long in the background. We want cheaper materials to begin with, and if Congress cannot frame a law for the benefit of ship-builders without exciting a conflict of interest among other classes of home producers, it must inaugurate prompt reform in national finances, such as shall bring down the cost of production to its natural level. Something must be done without longer delay, to resuscitate an interest that has been, in years gone by, the bulwark of our commerce, and to rescue our valuable carrying trade from the flags of other nations.

The *Iron Age* is the third iron sailing-vessel ever built in the United States, the other two being the schooner *Mahlon Betts*, built at Wilmington, Del., and the iron brig *Novelty*, recently built by the Atlantic Iron Works, Boston, for carrying molasses in bulk. Both are much smaller than the vessel launched at Wilmington last week.

Wilmington has important advantages over any other American port in this branch of industry. She has iron and coal in abundance at her very door, together with long years of experience. The firm who built the *Iron Age* have built upward of two hundred iron steamers, varying in size from 300 to 1500 tons. They have built for one firm alone, twenty-one steamers for the Gulf trade, and they have been thirty-three years maturing their plans to carry on this important branch of industry. They employ at present six hundred hands, but have facilities for employing more than twice that number should their business warrant it.—*N. Y. Shipping List.*

Closing of the Thames Tunnel.

On the 20th inst., the Thames Tunnel was finally closed as a public footway. This undertaking, which at the time of its design was considered a masterpiece of science, and which formed a communication under the Thames between Rotherhithe and Wapping, was, after numerous difficulties, finally accomplished and opened on March 23d, 1843, having been commenced by Sir I. K. Brunel in 1824. The total cost of the tunnel was about £600,000, but the East-London Railway Company recently purchased it for a little over a third of that sum. The company will run their trains through the tunnel, their line bringing the inhabitants of Wapping, Shadwell, etc., within easy distance of Southwark Park.

MINING SUMMARY.

Nevada.

THE CHOLLAR-POTOSI FIRE.

The fine new hoisting-works of the Chollar-Potosi Mining Company, at Virginia City, and the extensive buildings connected therewith, were burned to the ground on July 14th. The entire loss to the company, including the large three-story boarding-house near the works, a large amount of timber, four hundred cords of wood, etc., is estimated at over $100,000. The amount of insurance was $40,000. Most people were under the impression that the destruction of these hoisting works would interfere with the working of the mine and the extraction of ore, but such is not the case at all. The ore comes from the upper levels, through the old Chollar works and the Potosi tunnel. The new shaft and works were simply used in deeper prospecting and explorations. There were only four men working below, drifting at the 500 and 900-foot levels, and they made their escape by climbing down the ladders of the pump-shaft to the 1100-foot level, and out through the 1080-foot level of the Hale & Norcross mine, by means of the drift-connection made about five weeks ago. These works will probably not be rebuilt at that point, as the shaft was sunk too far west; consequently had passed through the west wall long ago.

AFFAIRS AT WHITE PINE.

The San Francisco *Times* has the following *résumé* of affairs at White Pine, from a correspondent at Hamilton:

"For the past three or four months curtailment has been here the order of the day, every thing tending gradually downward. First came the collapse in the mining-stock and claim market; then the decline in real estate, accompanied with a general reduction of prices, and a check on the incoming, with a marked decrease of the resident population. Up till about the middle of April, prices continued inflated, immigration flowed in, and the hopes of all were buoyant. Prior to that time, the capacities of the eating and lodging houses, and other places of public entertainment, were insufficient to accommodate the numerous applicants. The merchants were kept busy filling orders for goods, the gambling-clubs were liberally patronized, and the drinking-saloons were crowded with customers. The miners, having effected a good many sales in a small way, were, as a class, financially easy. Every body, confiding in their prospects, spent their means freely, while nearly all who came in brought with them some money, and the arrivals being many, we had for a season 'flush times' in White Pine. But the winter proving long and severe, placed an embargo on work of all kind, preventing the early realization of our hopes, and imparting to our affairs generally a dismal complexion. Money growing tight, checked remittances from San Francisco, which soon brought things to a crisis, and, by cutting off further supplies, sent thousands in dismay from the district. Soon rents and real estate began to tumble, a material reduction in the prices of every thing else having already preceded them. And thus it is that we find ourselves to-day on our backs, with business flat, and the prospects of the immediate future considerably clouded. But this reduction is, after all, only the healthful depletion of a too plethoric body—a bringing down of an over-obesity to hard and vigorous muscle. White Pine has vitality and backbone, and it is just as well that it should be forced into a normal, self-sustaining condition first as last. No mining district can ever be permanently prosperous, nor can its wealth look for a rapid development, under excessive high prices. The latter might, under favorable circumstances, have been kept up here for some time; but this condition of things could have resulted in but little benefit to any, and must soon have been brought to an end. With lower rents, and the cost of all the necessaries of life reduced, more will be accomplished, even though the wages of labor have to share in this common reduction, than if prices had been maintained at former high figures. We have just now a strike among the miners, who resist the substitution of $4 for $5 per day, their former rate of wages. But as the expenses of living here are now but little greater than in Virginia, or even in the mining districts of California, $4 would seem to be a fair reward for a day's-labor—those employed on these daily shafts working but eight, while all others work ten hours per day. None of the underground workings here have as yet attained to any great depth; wherefore, being free from foul air and dampness, they are less objectionable than those about Gold Hill and Virginia. The miner here can, for the next five or six months, get along with any sort of a temporary dwelling, thereby saving himself rent, while his fuel costs nothing; and as many parties would expend money in opening their mines with labor at $4, who would otherwise do nothing, the proposed reduction, if readily submitted to, would, no doubt, greatly benefit the miners, as a class, by largely increasing the amount of work to be done. It is generally believed that these men will soon perceive the error of the policy they have adopted, and accept what really seems fair wages for their work.

TOWN SITES ILLEGALLY MADE—SQUABBLES OF THE CLAIMANTS—DEPRECIATION OF PROPERTY, ETC.

"A few months ago none were so much envied as the real-estate owners of White Pine; more especially those who had possessed themselves of the original town sites, or had managed to gobble up large tracts of the public lands lying contiguous to the principal towns. It is true these entire tracts were mineral land, and, as such, excepted by law from this mode of occupation. Yet the most explicit provisions of the statute were disregarded—these men proceeding to take them up for the declared purposes of agriculture and grazing, a declaration that was at once stultified by their immediately laying them out into town lots, which were then disposed of as fast as possible. The question of the validity of these claims will soon be settled by adjudication in the proper tribunals, where a number of suits involving this issue are now pending; and, however it may result, these land-grabbers, with the exception of the few who realized early, are not likely to be enriched to anything like the extent anticipated but a short time ago. They are, moreover, at loggerheads among themselves, scarcely a single tract of these misappropriated lands being without two or three sets of claimants; and it is questionable if even the successful ones will have secured a fortune in obtaining a favorable verdict, or if the Government will finally permit them to hold these lands after they have vanquished their adversaries.

"At present sales can be effected, even of lots eligibly situated for business, only at a reduction of fully one third from the prices obtaining four months ago, while lots upon the outside tracts can scarcely be said to command any price whatever. Rents, except in a few choice locations, or where long leases had been entered into, have fallen one half, tenants finding it more difficult to pay these lower rates with a greatly diminished business, than those demanded of them along in the winter. With so little call for tenements, there is not much building going on, though the cost of lumber and every other material required in the construction of houses has declined greatly from former prices. In mill-building there is more activity, though even in this branch of improvement there is less being done than was expected, and less, perhaps, than the prospects of the district would justify.

NUMBER OF MILLS, BULLION PRODUCT, ETC.

"The number of mills now running in the district is thirteen, carrying a total of 135 stamps; there being several others in course of construction, or about to be commenced, and it is safe to calculate that there will be at least 200 stamps running here before the close of the year. Owing to the friable character of a good deal of the ore, these stamps will crush one ton each per day. As the average yield of metal is about $100 per ton, this would give a daily product of $13,500, or a monthly of $337,500, allowing that the mills run twenty-five days in the month. This, with the present number of stamps, would give an annual yield of a little more than $4,000,000, which the increased number of stamps in prospect would swell to over $5,000,000. It is by many believed that a much larger number of stamps than that above suggested will be operating here before winter sets in, or, if not, that the milling capacity of the district will be greatly increased early in the ensuing year, by which time, it is thought, Eastern capital will come to our relief, if it does not before.

INDUSTRIAL EXHIBIT.

"With business and the prices of property so much depressed, and so many obstructions in the way of progress, it might be thought that very little had yet been accomplished here in the way of material improvement. This, however, is not the case, as a very casual glance at the work performed and the improvements made will at once show. Not to speak of our towns, built up under great difficulties and at enormous expense, or of some two hundred miles of toll-road, also, constructed mostly in the winter, when the weather was bad and the prices of labor and every thing else ruled high; we have laid out considerably over half a million dollars upon quartz-mills, and more than twice as much in the development of our mines, upon many of which a very large amount of exploratory labor has been expended. Omitting the small instalments of work performed on a multitude of mines, and taking a synopsis only of the more important improvements made in this line, and of the operative force now in the field, we find that there were, prior to the late strike, over 1600 miners at work in this district, either for wages or on their own account—that, independent of the dead and exploratory work being done, there were extracted daily about 500 tons of millable ore, besides much that would not now pay for reduction—the quantity of ore raised and piled up about the various mines amounting to nearly five thousand tons, worth, say, $150 per ton. An enormous amount of work has been done by the Eberhardt, the Stanford, the Aurora Consolidated, the Hidden Treasure, the California, Glazier, Consolidated Chloride Flat, and several other companies—more than was done upon all the mines along the Comstock lead during the entire two years following its discovery. In our

PROSPECTING TUNNELS.

"A cordon of which now environ Treasure Hill, we have another heavy source of outlay as well as a creditable exhibit of enterprise and industry. Some of these tunnels have now reached a length of more than two hundred feet, and as the average cost of driving them has been about $25 per foot, it follows that large sums must have been absorbed by these works in the aggregate. Several of their number have already cut promising channels of vein-matter or developed valuable deposits of mineral, and if pushed only a moderate distance into the hill, they can hardly fail, in every instance, to reach ore-beds of greater or less value. It is a peculiarity of purpose with the projectors of some of these works that they are running them both for ore and water: the latter being here scarcely less important as an object of exploration than the former. The most noted as well as successful example of these double aims is supplied by the works of the Hamilton Tunnel and Hydraulic Company, operating about one mile easterly from the town of Hamilton, and near the base of Treasure Hill. Work was here commenced last April, since which time it has been pushed steadily forward; and as the Company already own a spring, situated a little above the mouth of their tunnel, insuring a moderate quantity of water to start with, they are almost certain of getting an increased and very likely bountiful supply when they shall have penetrated further into the mountain. What is quite remarkable, this Company have already cut in their tunnel a heavy belt of low grade ore, assays running from $75 to $150 per ton. They do not, however, expect to strike any very valuable deposits until they reach the great ore channel that, passing through the Excelsior and Virginia mines, lies right in their way, and is known to be ribbed with metalliferous strata of spar and quartz. This work is owned chiefly by J. W. Jones, managing agent here, and by M. T. Brewer and A. C. Latson, all now or formerly residents of San Francisco. At Shermantown, and also at a number of points in the vicinity of Hamilton and several other places, tunnels have been run for the sole purpose of obtaining water, some of which have been entirely successful, while none have wholly failed of their object. Water is also being found by digging much more generally than was expected, relieving the question of supply of its more stringent phrase, to say nothing of the superabundance of this element that will be afforded through the agency of the Von Schmidt Water Works, the noblest, because the most useful work yet projected in White Pine. To estimate its value, either from a sanitary or mere utilitarian point of view, one must understand the straits to which we are often reduced in a hot and arid country like this. The water itself is of the best quality, and will be supplied in quantity

ample for every requirement, whether it be for use as a fire-extinguisher, for irrigating the land, for culinary and other domestic purposes, or for supplying the various wants of quartz-mills. With the present hoisting capacity employed, 2,500,000 gallons of water can be sent into the Company's main reservoir daily, an amount that can easily be doubled whenever the consumption may call for it. This water will be introduced into this place early in August, and into Treasure City a few weeks later. This work, originally projected by Colonel D. W. Von Schmidt, the distinguished San Francisco engineer, and which until one month ago was under his personal supervision, is now in charge of that gentleman's brother, Julius Von Schmidt, also a man of first-rate attainments in his profession, and of Colonel Bulkley, prominently connected with the Northwestern Telegraph enterprise. With an abundance of pure, fresh water, and a little snow to reduce its temperature, one of the greatest discomforts of this dry and torrid climate will be measurably alleviated. The White Pine ice-house may justly be classed among refrigeratory anomalies, consisting of a huge pile of snow thrown up during the winter, and covered with pine boughs to protect it from the sun, and which, thus shaded, becoming congealed into almost a mass of ice, lasts until late in the summer.

"Before discussing the subject of prospecting tunnels, it might have been pertinent to observe that a project is now on foot here for carrying on these exploratory labors by means of artesian borings, instead of resorting to shafts and tunnels as at present. That the thing is entirely feasible, being equally as effective as the modes now in use, while it could not be attended with a quarter of the expense, seems undeniable; and as the project is in the hands of a man eminently practical, we anticipate its early and successful introduction into this district. In regard to

THE METEOROLOGY

of this region, it may be remarked that the days are, with few exceptions, warm, and even hot, while the nights are invariably cool and occasionally frosty—ice having formed to the thickness of half an inch several times this summer. Thunder-showers occur every week or ten days, continuing from half an hour to an hour or more, the rain generally falling heavily. From this time on they will be less frequent, August and September being usually dry months, with very little precipitation in October and November.

THE SWANSEA SMELTING-WORKS

still 'hang fire,' but the late Superintendent, Mr. Mosheimer, having been superseded by Professor Keyes, the works may be put in operation any day this week. The furnace and machinery are not yet housed over and may not be this summer. Experts are very curious to see how the smelting is to be performed with this furnace. The body of the furnace is built of sun-dried bricks, and the lining is of common fire-brick. The whole is strapped together by broad bands of iron on the outside. The shape of the exterior is that of a common square cupola, and it is about twenty-five feet high. So far as the furnace itself is concerned, it is poorly calculated to do even a tenth part of the smelting work of this district, even if it shall succeed in smelting the ore at all. The Superintendent of this Company selected a spot for the works where there is no water, and that indispensable element must be conducted to a large tank in pipes from the next cañon, or brought up from the well at Swansea in carts. If the rumor is true that the Company were obliged to pay the Superintendent $1700 for this location as a site for their smelting-works, while at the same time it cost the Superintendent nothing, it may safely be thought that the latter made a good thing, while the Company make just what it cost the Superintendent. But the latter came to White Pine to make his fortune, and why shouldn't he make it quicker out of his Company than he can possibly make it out of the ore to be smelted, even if he can smelt it successfully?"

Colorado.

ANOTHER BORING PROJECT—PROSPECTING WITH THE DIAMOND DRILL.

THE Colorado *Herald* has the following account of prospecting a mine on Fletcher mountain by means of the Diamond steam drill:

"Mr. Rockwell, agent of the Incas and Bullion Consolidated Mining Company, has been driving a tunnel into Fletcher mountain, near the head of Black River, for his company, and has reached a point 600 feet from the surface. To strike the lode aimed at will require a tunnel at least 1200 feet long. To facilitate this work he has made a contract with Messrs. Severance and Holt, of the Diamond Drill Company, New-York, to bore a hole 2 inches in diameter and 800 feet long, beginning at the end of the tunnel. The machinery which is to perform this work will arrive in Denver in a short time, and will be put in position and started early in September. The work can be performed in 80 or 90 days. The boring of this hole is simply to prospect the mountain, and will be like paying for a watermelon to see if it is ripe. The core of the hole comes out in sections, without being pulverized, as the work progresses, and the character of the ground passed through will be carefully noted. The benefits to be derived from this work are many and important. It will tell definitely the extent and quality of the mineral vein to be reached, and thus, for a comparatively small expenditure, render certain what otherwise must have remained in doubt until the tunnel was completed. Tunnelling enterprises would be very popular but for the doubts which always occur, that, perhaps, when the work is accomplished the vein may be of no value. This plan of boring a hole, therefore, we think, is a very good idea. The machine, we understand, is something similar to that used in boring Artesian wells. It would be a good idea to use it here for going through the cap, or for prospecting the Mammoth lode at a great depth, or for draining some of our mines. In fact, we can think of a great many ways in which this machine may benefit us here. There is no doubt about the machine being able to perform the work, as it has been in use in marble quarries East."

THE WILSON STAMP-MILL.

THIS promising steam stamp-mill is about to be practically tested near Central City. The *Herald* of that place has the following account of a preliminary trial which recently took place:

"A number of prominent and successful mill-men of this county, yesterday, visited the Wilson Steam Stamp-Mill, which has recently been put up, on the Cleveland lode, Trail Creek. It is owned by the Bennett Mining Company, and has been put in place by Mr. William Jones, the agent of the Wilson Company. It is, without a doubt, a very perfect piece of machinery, and performs the work for which it was made in a very satisfactory manner. One run had been made with the mill before we saw it in operation. It crushed two and a quarter cords of ore, using about one and a quarter cords of wood, and performing the work in about 24 hours. While we were there, yesterday, the machine was running with fifty pounds of steam, and striking 300 blows per minute. The pulverization can be regulated by the screen, and the amalgamation is also a matter independent of the crushing. The ore escapes from both sides of the battery, and we suppose there will be no difficulty in enlarging the tables to any extent if thought necessary. Those in the Bennett mill we think too small for the quantity of ore crushed. But this will soon be settled definitely by experience. The mill, in operation, is not at all like the stamp-mill—it strikes a quick, strong, clear blow, not at all like the drop of the old-fashioned stamp. The apprehension expressed by many that so small a machine would necessarily jar itself to pieces, is altogether unfounded. Every part of the machine is so nicely adjusted, and so firmly and substantially put in place, that there is little or no jarring at all. The working capacity of the mill will be two cords of ore in 24 hours, using one cord of wood. Our millmen can make their calculations from this statement. We regard it as a perfect success, so far as crushing ore is concerned. It does the work well; does it quickly, and the expense is much less than in an ordinary stamp-mill. The Cleveland lode, upon which the mill is built, has a strong vein of ore, and this mill can easily be kept supplied with ore. Mr. Bennett claims that the ore will yield about $100 per cord. Mr. Jones will soon have one of his mills in operation in this county, and all will have a chance to see it in operation."

Pennsylvania.

THE OIL REGION—DRIFT AND PROFITS OF ITS TRADE.

A CORRESPONDENT of the *Beaver* (Pa.) *Radical* thus sketches the *modus operandi* and profits of the Western Pennsylvania oil trade:

"The oil interest of Pennsylvania ranks next to the iron interest. It has entered into the commerce of the world, and more of the article is exported than is consumed at home. Considering the millions which have been lost by dry wells and by the collapse of the business, which took place a few years ago, it is doubtful whether as much money has been taken out of Venango County as was carried into it; but there is no doubt that all the lost funds will yet be found, though not by all the original owners. The oil business has become systematized; the mode of drilling and tubing has been perfected, so that a gang of hands will put down a well of 877 feet, to prepare it for pumping, in the short space of thirty days. Very large wells have become rare, and very many have become dry. To bore a well costs between four and five thousand dollars, and is a hazardous enterprise for a man of small means. Yet, for all this, there is no business in the world so safe and so snug as the oil business. Take the Niagara farm, for instance, owned in part by George V. Boyles and the Phillips, and managed by those gentlemen. The daily product of oil from ten wells is upward of 300 barrels, which at $5 a barrel—and it was selling at $5.60 when I left—amounts to $1500 a day. Knock off $500 a day for expenses, and that leaves a clear gain of $1000. Now what merchant, what farmer, what lawyer, with all his care, taxing, and drudgery of mind and body, has such an income? Nearly all the Niagara wells yield gas enough to drive their own engines without other fuel, thus saving coal, which costs $10 a ton on the ground. Each well has a tank of the capacity of six or seven hundred barrels, all connected with a large reservoir below by pipes. As these tanks fill, and a sale is made, the oil is measured, and the pipes carry it to the reservoir below, where at twenty cents a barrel, it is pumped by steam over the hill into another large iron tank of immense size, whence it goes into the oil-cars, and off to Cleveland and other markets. When an oil-producer sells a thousand barrels, therefor he simply gets a receipt for it at the office of the transportation company, and upon it receives a check for the amount.

"The trade in engines, tubing, pipe, and other fixtures needed in the oil business, is immense; and, to my surprise, I learned that Pittsburg, which should have controlled it, has almost nothing of it. Utica and Rochester, in New-York, take coal and iron from Pennsylvania, manufacture engines, and send them back through Pittsburg cheaper and better than they could be made in the 'Iron City' itself. Gas-pipe, which is ordered and used by the mile, all comes from Philadelphia and Reading, and the nice brass work comes from New England. Cleveland purchases and refines the most of the oil, and sends it off to Europe down the St. Lawrence. With its nearness to the oil regions, and its superior facilities for manufacturing all that is needed in the oil business, from an engine down to a monkey-wrench, Pittsburg allows Utica and other towns to rob her of a trade worth millions every year. This comes from old-fogyism and antediluvianism."

California.

THE NEVADA COUNTY MINES.

THE Nevada *Gazette* of July 28th has this intelligence:

"We learn that Captain Lee has now a full force of workingmen employed in the Empire mine. A number applied on Monday, for whom there was no room. Among those employed are a few of the old hands, who have abandoned their opposition to giant powder, or were, perhaps, dragged into the league, in opposition to their better judgment.

"F. A. Hassey, of San Francisco, has offered $300,000 for the North Star mine in Grass Valley. The owners rejected the proposition."

The *National* of the 27th has these items:

"We understand that work in the claims of Jacob & Sargent, at Quaker Hill, has been discontinued on account of the failure of water. They have an immense tract of good mining ground, which has a frontage of three miles, embracing about 1000 acres in all.

"Work was suspended this afternoon in the Eureka mine, in order to give the employés an opportunity to attend the funeral of their deceased friend, James Pearce."

The Grass Valley *Union* says:

"The Idaho cleaned up on Monday, after a two weeks' run, and the result was $12,500 in gold. The usual dividend will be declared on the first of the month."

THE PLACER IRON MINE.

THE Placer *Herald* of July 24th says: "This company, known as Brown & Company's, have been shipping ore to the Pacific Rolling Mills in San Francisco, where it is pronounced the best and purest ore yet tried in the State. An order was received, and some twenty tons shipped on last Saturday, and, when smelted, yielded about 76 per cent of pure ore. These mills have been trying the Shingle Springs ore, but find it too full of foreign matter and dirt to work to advantage, and have commenced ordering exclusively from the Placer mine. This mine is about six miles from Auburn, and convenient to the Pacific Railroad at Clipper Gap, and is inexhaustible, there being from forty to one hundred acres of almost solid iron ore exposed on the surface, and reaching down to an unexplored depth. Should freights reach a point to make it profitable to quarry and ship this ore, the mine will supply the entire wants of the State."

Missouri.

THE SHANNON COUNTY COPPER MINES AGAIN.

ST. LOUIS, MO., August, 1869.

TO THE EDITOR—SIR: Some weeks since you reproduced from the *Ironton Enterprise* an article written by myself, giving a history and description of the Shannon County Copper mines. In your remarks, you say it was doubtless written by an interested party. This is a mistake. I have no interest whatever in the property except such as any citizen of the country should feel in a mine which, under proper management, would add greatly to the wealth and prosperity of the county. You also make me say that eight tons of smelted copper was produced—the original article read eighty tons, which was the amount made. Something over seventy-five tons of very rich ore was also transported by teams and shipped. My article was written in haste, and without any idea that it would be reproduced. The original in the *Enterprise* made me use a number of terms unknown in mining or mineralogy. For instance, I was made to say northern for mother lode; green for gray; sulphurets, and numerous other outlandish terms. These, I believe, you corrected, and you have my thanks for so doing. Before closing, I will remark that there are numerous other points in Shannon County where copper has been found in greater or less quantities. In fact, the copper range may be said to extend across the entire breadth of the county, from two to six miles wide and some twenty long. T. B. D.

Michigan.

THE COPPER MINES.

CORRESPONDENCE from Eagle River, dated July 29th, states:

"The explorations on the Cliff still continue, a force of about twenty men being employed. The finding of conglomerates cast on their property is exciting much comment. The specimens exhibited are quite rich in copper. Private property anywhere in the vicinity of the explorations is going up at the rate of about a thousand dollars a day.

"At the Phœnix Bay State the drawing out, almost daily, of six and eight ton masses of copper still continues, and the prospects are good for a continuance for some time yet. The Robbins, or west vein, is not producing any heavy copper just now, but turns out some exceedingly fair stamp-work. In many places the vein is from six to eight feet in width. The stamps are doing very well.

"At the Central there is nothing particularly new; masses abundant, as a matter of course. Reports say that negotiations are making to work a steam-drill in putting down their inclined shaft.

"Copper Falls is still opening, and the stopes are being pushed as fast as the openings will permit."

Utah.

NEW GOLD DIGGINGS.

THE White Pine *News* of July 24th has the following: "Two miners left here yesterday for the rich placer and quartz gold diggings near the head of Sevier River, Juab County, Utah. The placer diggings there have been known to exist, and have been worked by the Mormons for more than a year, but not until recently was rich auriferous quartz found in the mountains some distance above the river and gulch-workings. These ledges, some of which are very rich, mostly cluster around the sides and base, or western slope of Mount Nebo, which reaches an altitude of 12,000 feet, or nearly 3000 feet higher than Treasure Hill. The country has an abundance of water, and all the streams great fall, except the Sevier itself, which becomes sluggish after reaching the open plain, a few miles from the lake of the same name. The climate is delightful, winter and summer, and it is not at all improbable that some very rich mines will be found in the mountains near the head of the Sevier."

Lower California.

THE Mazatlan correspondent of the San Francisco *Bulletin* says: "The new law, making the exportation of ores free has benefited considerably the mining interests of this part of the country. Numerous mines have been taken up again after having stopped for many years on account of the rebellious character of the ores, and prospecting has become a new trade. This led to the discovery of the rich mine of Biriuroa, near Tapia, which promises a fabulous wealth, the vein being very wide, and the assays showing enormous richness. At Cosala, the Cosala Mining Company and Nuestra Señora are taking out rich ores, the latter furnishing 100 marks of silver weekly. At Copala, the Sombrero mine is in *bonanza*, and the Tajo mine will finally be enabled to work up its large stock of ores, having received new machinery by the brig *Schelekoff*."

Idaho.

COAL.

THE development of a good vein of bituminous coal on Reynolds Creek, about two miles northwest from Ritchie's place, is announced in the *Avalanche* as progressing favorably:

"The Company have run a tunnel into it some thirty feet, and find a twelve-foot vein, and the coal is of a good quality. Indications of the existence of a good mine have been getting better as they progress with the tunnel. McMahon intends testing samples of the coal next week, for smelting purposes."

Missouri.

THE business is iron extending in Missouri. A St. Louis paper says: "A furnace of the Kingsland Iron Works has been started in Carondelet, and a second furnace belonging to the same works will be in operation in a few days. If these prove successful, the Company will build two much larger ones, and probably a rolling-mill also. Ground has been broken for two furnaces for the St. Louis Iron Company."

Brazil.

A GOLD mine is reported to have been discovered in the mountains of the province of Espiritu Sancti. The place was previously always considered public land, being worth nothing, but of course now there are several claimants of it as their long-held property.

Gunpowder Hammer for Driving Piles.

THE driving of piles for foundations of all kinds has been carried on ever since the necessity showed itself of building on soils too soft to support the structures. The piles are either driven until they reach a hard soil, so resistant as not to give way under the load to be placed upon them; or if this hard soil lays too deep to be reached, the piles are driven so far that the lateral pressure is sufficient to prevent further set tling under the incumbent weight. In the latter case, a good calculation based on experiment is required to insure success.

The old pile-driving machines were worked by hand. A dozen or so of men hoisted the hammer, by means of a single pulley, for the distance of some three or four feet, and then dropped it. Where hand labor is cheap this method is still in use, the hammer making from 40 to 50 strokes per minute. In this country, steam has been employed for many years. Attempts have been made to use electro-magnetic power, which might have succeeded if electricity were not so expensive a power. The last and best improvement is the chemical pile-driver, as it might properly be termed, since it works through the chemical decomposition of a peculiar mixture into its constituent gases. The most appropriate mixture is, of course, a fulminate which explodes by means of a blow, so that no separate contrivance is required. In this case, the fall of the hammer ignites it. The effect is the same as in the case of a projectile fired from a cannon. The pile is acted upon just as powder acts upon the cannon in case of recoil, while the hammer takes the place of the projectile; with this difference, however, that the respective weights are not so very unlike, as is the case with the cannon and ball, the pile being not as heavy as the cannon, nor the hammer as light as the ball. The hammer will not, therefore, be propelled with the velocity of the ball, but the pile will be driven downward with a comparatively greater force than that exerted in the recoil of the cannon. The effect of the force is, therefore, more evenly divided between the two. An apparatus acting upon this principle has been brought out lately by Mr. Shaw, who calls it a gunpowder-hammer. It is now attracting great attention among engineers, particularly those engaged in the construction of buildings.

The machine is constructed of heavy wood framing, as in the ordinary pile-driving machines, and is provided with a cylinder head of cast-iron K, resting on the top of the pile C, and guided by the iron rails N; the cylinder is bored out on its upper end for the reception of a plunger S, and of the hammer H, and is cast concave on its lower end for the reception of the pile C. The hammer H is guided by the rails N (the same as the cylinder), and is bored on its upper end for the reception of the piston I, and is cast with a V-groove for the reception of a friction-rod M (Fig. 2), to be used as hereafter described. The piston and rod I are connected with a cross-beam, firmly united at the top of the frame, where a rope-pulley F is also placed for the convenience of hoisting the piles in position. The friction-rod M is connected with the starting-lever O, also with short cast-iron arms pivoted to brackets L (Figs. 1 and 2), for the purpose of pressing tightly against the V-groove in the hammer, whenever the hammer moves in a downward direction, as shown in Fig 2. A ring is made of steel and screwed on the end of the plunger S; this ring, though of solid steel, expands under this pressure the same as hydraulic packing, and makes a tight and durable packing.

The machine is operated and controlled by a man and boy; the latter is stationed at the rope-ladder G, and throws a cartridge of powder into the cylinder K; when the hammer is allowed to drop by the man's pressing upon the lever O, which elevates and releases the friction-rod from the hammer, and causes it to drop, forcing its plunger into the cylinder, contracting and heating the air contained therein sufficient to ignite the powder whenever the plunger comes in contact with the cartridge tearing the paper, so that the heated air may come in contact with the powder. The explosion of the powder elevates the hammer, and the recoil of the cylinder forces the pile into the ground When the cartridges are thrown at the rate of 50 per minute, the hammer is operated without the use of lever, except when desiring to cease operating.

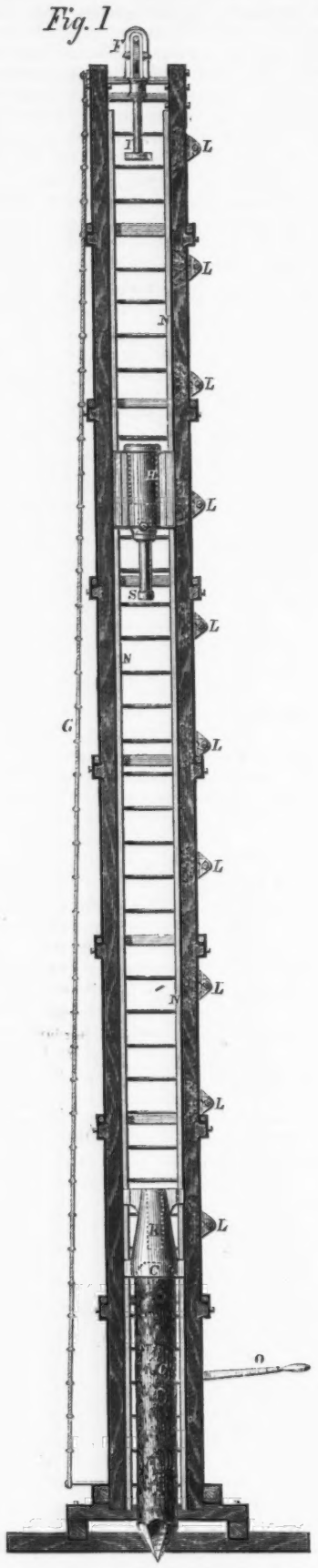
The object of the air-cushion at the top formed by the bore in the hammer H and piston I is to prevent a heavy charge from injuring the machine.

The powder employed is of the most simple character, being composed of 1½ parts of chlorate of potash, and 1 part of bituminous coal, both pulverized and mixed through an ordinary sieve. This powder burns very slow in the open air; a barrel full might be ignited at once without causing any report. The charges of powder are exceedingly small; a charge of ½ of an ounce being employed to throw a hammer of 675 pounds weight, and exerts a force on the head of the pile equal to a dead weight of 300,000 pounds for a temporary period.

The pressure is exerted on the head of the pile during the presence of the plunger in the cylinder. This gives a blow and pressure of the character of the hydraulic press, with the rapidity of the hammer; hence, the pile can be driven more rapidly, and forcibly, and firmer without in any way injuring or splintering the pile, as in the common method of driving.

The usual wrought-iron ring secured to the head of the pile, preparatory to driving, is in this method entirely dispensed with, and it is estimated that even this trifling advantage will nearly pay for the powder employed, Piles can now be driven so rapidly as to constantly employ a steam-engine in pulling to and hoisting the piles in position. It is believed that it will take fifty per cent less piles when driven in this manner, as the pile is not shattered by riveting blows,

Fig. 1

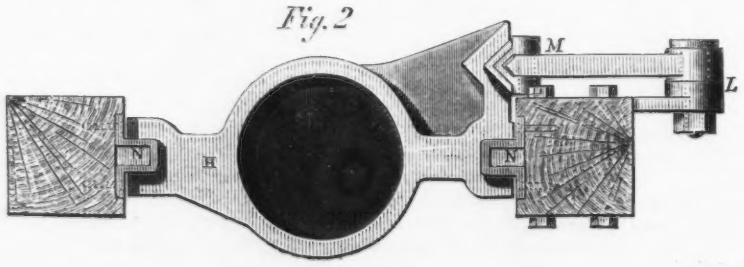


SHAW'S GUNPOWDER HAMMER.

which destroy the strength of the wood, nor is it vibrated (like a piano-string) throughout its length by sudden raps, which destroy, to a great extent, the lateral adhesion.

An extract from the report of the Committee of Engineers for

Fig. 2



HORIZONTAL SECTION.

investigating the operation of Shaw's Gunpowder Hammer in driving piles at Lynn's Ship-Yard, Philadelphia, June 15th, 1869:

Respectfully represents that the machine is operated and controlled by a man and boy, and that it can be made to strike forty-eight blows per minute, also single blows at the will of the operator. And that, although the piles were driven in tough soil, the head of the pile was not hooped, and was driven 30 feet in the ground without any way injuring or splintering the head of the stick; showing the extraordinary pushing character of this method of pounding. And that ½ of an ounce of powder throws the hammer a distance of 8 feet, and that the hammer was allowed to fall a distance of 8 feet on a solid block of wood placed on top of the cylinder, and it forced the pile only $\frac{13}{18}$ inches in the ground; and that at the next blow powder was used, the hammer allowed to fall the same distance, and it forced the pile 4 inches into the ground; showing conclusively that the blows are not only made rapidly, but that each blow is five times as effective as by the falling of the weight alone.

It is added, in conclusion, that this novel application of gunpowder is an unqualified success for the purpose of driving pile, promising as it does a saving both of time and labor, which should commend its use to all who require machines of this character. The report bears the following signatures:

W. W. W. Wood, Chief Engineer of the U. S. Navy; F. P. Lovegrove, Chief-Inspector of Steam Boilers; H. L. Hoff, Eagle Iron Works of Philadelphia.

Many eminent gentlemen who witnessed the above investigation of the Committee of Engineers, have signed an article that it is their conclusion that this method of operating hammers is the correct one for all heavy work, and that it is of simple construction, easy management, and will prove its usefulness to the mechanical world. Letters asking for information in regard to this noted invention should be addressed to The Gunpowder Pile-Driving Co., 505 Minor street, Philadelphia, Pa.

How to Visit Montana.

THE stage-lines for Idaho and Columbia River, and also for Montana, leave the railroad route near the head of Salt Lake. The distance to the capital of Idaho is 250 miles, and to Columbia River 500. On the Montana line, it is 300 miles to Virginia City, 425 to Helena, and 560 through to Fort Benton, the head of navigation on the Missouri River. The rates of stage-travel are about twenty cents a mile, and the meals at the stations along the roads generally $1.50. This is the quickest route for reaching Montana. The only alternative left is to go up the Missouri River on steamboats to Fort Benton, which is within 100 miles of the heart of the Territory. But the river journey is long, nearly 2000 miles, and tedious, requiring from two to three weeks. The mere visitor to Montana, at least, should go by the stages from Salt Lake, across to Fort Benton, and then pass down the river, either by steamboat or on an open floating-boat, to Omaha. Such a trip would take in all three weeks to a month, but be a very interesting and recompensing circuit. The stage service on the Montana route is, perhaps, the best on the continent; the roads are hard and excellent, the scenery, through an open mountain country, fresh, picturesque, and every way inviting.—*Exchange.*

The Hoosac Tunnel Work Progressing.

THE new contractors for excavating the Hoosac Tunnel are pushing the work ahead quite rapidly. During the month of June they drove the heading at the east end in 160 feet, and it is in now over a mile and an eighth. The first week in July they made 30 feet, and the next week 40 feet. The first and second enlargements are also being pushed ahead vigorously. They are having new drills made to operate on the roof, which they hope to have in operation in September, and by which they expect to increase their progress very materially. They are also erecting buildings near the mouth of the tunnel for four additional compressors, so as to give them more power. They will be run by steam. They have now 200 men at work at the east end, divided in three gangs, which work night and day continuously, resting only from midnight Saturday to midnight Monday. The central shaft is down about 700 feet, and is sunk at the rate of more than a foot a day. At the west end they have just got fairly at work, and they expect to make over 100 feet a month.

Humboldt's Centennial.

ON the 27th day of July, the students of Berlin, with a truly Teutonic spirit, celebrated the centennial of the great Humbolt. Our Minister, Mr. Bancroft, was quite at home among the boisterous students. Mounting upon a table, glass in hand, he gave utterance to the following sentiment: "America takes part in the centennial festival in honor of Humboldt, and rightly, too, for the name of 'Humboldt' is synonymous with liberty, science, and benevolence. I rejoice at being here with you, and this hour recalls the time when I, too, had the happiness to belong to a German university. Unite with me in a toast to the free, creative, immortal youth of Germany."

Velocity of the Wind.

IT is stated that, at Philadelphia, the mean velocity of the wind during the entire year is found to be about eleven miles an hour; at Toronto its average velocity is nine miles; and at sea it is estimated at eighteen miles.

THE ENGINEERING AND MINING JOURNAL.

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SUBSCRIPTION.—*The terms are as follows: One copy,* **$5** *per annum in advance; three copies,* **$13.50**; *five or more copies,* **$4** *each.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages,* **25** *cents per line each insertion; the outside or last page,* **40** *cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, 121 *Nassau Street, New-York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

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The postage on THE ENGINEERING AND MINING JOURNAL *is twelve cents a year, payable quarterly, in advance, at the office where received.*

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GEO. E. CUMMINGS *is our Agent at Philadelphia. Office,* 154 *South Fourth Street, Room* 5.

WESTERN & COMPANY,

Publishers and Proprietors,

37 PARK ROW,

P. O. Box 5969. New-York City.

Litigation in White Pine.

THERE has been much less litigation in White Pine District, Nevada, up to the present time, than we were led to expect at the outset, from the vague absurdity of the mining laws, and the locations under them, and from the indefinite character of the deposits. In common with most observing men, we naturally looked for violence first, and suits at law afterward. In both these anticipations we have been measurably disappointed. Until the last few weeks (which have been characterized by a slight outburst of highway robbery, stabbing, and shooting), White Pine was remarkably quiet, temperate, and industrious for a new mining camp. Some malicious people say that so many "roughs" flocked into the district that there was no chance to intimidate any body by violence, since the desperate characters intimidated one another. But this cynical explanation is not the true one. As a matter of fact, roughs fight with one another more than with any one else. Charles Lamb long ago exposed the popular fallacy that a bully is of course a coward. The reasons for the peaceableness of White Pine lie in its peculiar character and history, and are curious enough to be detailed.

In the first place, the excitement concerning this district occurred at a time when the mining population of the Pacific slope had learned wisdom by many such experiences; and a large proportion of the locaters are old miners, resolved not to waste what they gain, as they have so often done before, in gambling, drinking, and dissipation. In the second place, the ores of White Pine were, at the beginning, rich enough to make desultory mining by individuals quite profitable. For months the slope of Chloride Flat looked almost like a *placer* gold-digging of the early days. Each miner worked with pick, gad, and shovel in his little pit, collecting in a canvas bag the rich ore he obtained. Questions of boundary were not raised. There was, for the time being, enough room for all. But one difference existed, fortunately for the peace of the community, between this state of things and placer-mining. The miner did not go from his daily labor with his earnings in his pocket. The reward of his toil was in the form of ore, which must be accumulated and sent to mill before he could realize its value in money. In a placer-camp every body is 'flush." Gold-dust forms a currency; and the temptation to spend that which is money as soon as it is obtained is often irresistible to the miner without means of rational amusement. Now, in White Pine, people have been in a chronic state of poverty as to pocket from the beginning. When they have made money, they have made it in lumps, and gone elsewhere to spend it. But there has been no such steady dropping of daily plums into individual pockets as usually fosters extravagance in mining camps. Even the men who are at work for $4 or $5 per day seem to have caught the general infection of economy and sobriety; and the complaint of liquor-dealers, merchants, and showmen is that no money can be got out of the people. This, we need not say, prevents that vast amount of violence which originates in loafing and getting drunk. Finally, White Pine came sooner into contact with civilization than other mining districts. The railroad precipitated upon it a law-abiding population before any reign of violence could be established. Courts and magistrates have been in operation from the beginning. So this community has been spared the era of revolvers and lynch law.

Our anticipation of ruinous litigation has likewise been agreeably disappointed. White Pine titles are not much better than they were; but proprietors of adjoining claims have in many cases preferred compromise to a struggle, which would ruin both. In many other cases, they keep quiet until by selling out they can shift all possible future difficulty upon the shoulders of a purchaser. Only two or three important cases have got into the courts; but the points settled by these have covered the issues at stake in many others. On the whole, we think the result of all these decisions has been favorable to peace in the future.

Of course, the question whether there are any true fissure-veins on Treasure Hill, or, rather, whether the deposits of silver ore on Treasure Hill are true fissure-veins, has been brought up in several cases. It has not been legally decided in any of them, for a very good reason. It is not clear, in fact, and therefore it cannot be made subject of a definite judgment of court. We are inclined to believe that none of the principal mines thus far discovered are upon fissure-veins; but we do not think that the title to a mine should turn on the opinion of a geologist. In cases so dubious as this of White Pine, square locations which leave no uncertainty as to boundaries would have been better from the beginning. Then the *savans* might have fought out their theoretical battles with much less danger to the public interest, and with much more likelihood of agreement. For there is nothing that disturbs the coolness of professional observers like the knowledge that money is dependent upon the views they take of some knotty questions. Men who, if left to themselves, would modestly compare their opinions with those of their brethren, become, as feed witnesses upon the stand, dictatorial, didactic, and obstinate. They defend their own half-formed theories like paid advocates; and the well-known result of the mining trials in which scientific witnesses are called is to "set the experts by the ears." People often wonder "why the geologists can't agree." Because, gentlemen, you pay them well to magnify and perpetuate their disagreements.

In the Eberhardt and other cases, tried at Austin, we believe, before the organization of White Pine County was complete, it was decided that under the laws of the district any connected body of ore can be held by location to the extent claimed, whether it occurs in the form of a vein or not. This removed the necessity of abstruse geological evidence and argument for settling a simple question of title. A recent decision by Judge Beatty, in the Aurora *vs.* Earl case fixes some other important points, for which we have space for only one or two.

This decision contains an extra judicial opinion, construing certain sections of the mining law to require, for the holding of a claim one year, not merely two days' work on the whole claim, whatever be the number of feet, but two days' work *on each two hundred feet.* This opinion, not being fairly within the grounds on which the case is decided, has not the full force of law; but there is little doubt that when the question comes up, it will be so decided; and such an utterance, from a judge so widely known and respected, will have great weight. We fancy it will cause some fluttering among the holders of locations who claim one or two thousand feet, and have no idea of the whereabouts of their property after the first hundred feet. It will now be necessary for them to trace it throughout its whole extent, and do work upon each section of it. This will be in many cases impossible—"and what will the miner do then, poor thing?"

Another point settled in this Aurora case is that "a wall doesn't make a vein." We have often heard of the numerous beautiful walls exposed in the mines of Treasure Hill. One of these, "a smooth, even surface, extending from the mouth of the incline to within two or three feet of the bottom, crossing the general stratification of the country, highly polished in places, exhibiting marks of striation, conforming very nearly, if not exactly, to its dip (30° or 40° E), and overlaid generally by a thin stratumof clay or soil"—figures in this case. Could any thing be more "true fissure-vein" like than this? A wall, selvage, slickensides, lines of movement, and all! Yet Judge Beatty's extremely clear decision sets the matter in its true light. Says he: "When it appears that there is *as much, if not more, ore* below than above it, it loses the character of a foot-wall in my estimation. It shows that the fissure *was formed subsequent to the deposit of ore.*" The whole of this opinion is exceedingly forcible. We are glad to know that such is the temper in which the exceedingly imperfect laws of White Pine are being administered. There is common-sense on the bench, whatever there may have been in the miners' meeting.

But no one should perceive more clearly than Judge Beatty that having (rightly) knocked away the walls from a good many mines by this *dictum*, he has left the owners without any boundaries, except such as compromise or fresh judicial pronunciamentos may give in each case. The best thing about this decision is, that it helps bring matters *ad absurdum.* The miners' meeting, the other day, virtually refused to alter the present district-laws. Very well, gentlemen; go on and make matters as bad as you can by way of hastening reform. By and by, you will be a little tired of having your titles depend on "connected bodies of ore," instead of accurate measurement.

R.

The Protection of Inventions by Law.

IN one of our last numbers, in speaking of the inventive genius of the Swiss nation, we made at the close a few remarks, which we do not wish to be misconstrued. We would not have it supposed that we are in favor of the abolishment of all patent laws, a question now greatly agitated in some quarters. On the contrary, we consider that the products of brain-labor deserve the same protection in the interest of the producer as the ownership of any other product enjoys. We believe that to take away protection from the useful results of inventive minds by means of patents would be no more than paralleled by the abolishment of their right to ownership of material things. We ask, therefore, why should the owners of property as such enjoy such great advantages over the owners of patents, the application of the principles of which it has perhaps taken years of patient labor and self-denial to make successful? We are satisfied that valid arguments could as well be brought to bear against the system of protecting inventions for only a certain number of years, when other property is protected not only for a lifetime, but from generation to generation. It might be argued that the descendants of many great inventors, of whose labors thousands at present enjoy the benefit, are poor; while the descendants of those, who, perhaps, fraudulently obtained possession of tracts of land from the aborigines, and never labored either with their hands or brains, live in opulence, being by the laws of the land for ever secured, not only in the permanent possession of what is called their property, but also in the full benefit of all advantages resulting from an increase in their value, by the work of their neighbors, or other surrounding circumstances, they themselves contributing nothing whatsoever thereto. That the patent laws are partly defective; secondly, abused; and thirdly, do not in all cases meet the expected and desirable ends, is no reason for abolishing them. One might as well talk of abolishing schools and churches, on account of defections, abuses, and lack of completeness as regards their results. All that is necessary to be done is to remove the existing defects, give heed that they are not abused, and see to it, that, with an eye to justice for all, the desired end is obtained.

Another point is often overlooked: inventors are apt to forget that the patent laws are instituted not only for their especial benefit, but also in the interest of general progress. The inventor must give a truthful description of his process, which is recorded for general information; in return, he obtains the advantage of the exclusive right of using his invention for a certain number of years, after which it becomes common property. The record of patents is, therefore, to a great extent, a complete detailed history of a nation's intellectual and industrial progress, and as such it is seen that the American records are of great value, particularly when we consider that, in the main, only practical useful inventions are secured by letters patent. The English and French records are, comparatively, of much less value. They give patents for almost any thing, without regard to novelty, practicability, or usefulness.

But the strongest argument in favor of good patent laws, is not grounded in the interest of inventors, but comes from a higher source—to wit: the industrial progress of the whole nation. In order that the full force of this statement may be felt, let us contemplate what would be the result if all protection of inventions by patent were abolished. Almost all of our inventors would, under such circumstances, keep their inventions a secret, and carry them with themselves to their grave, in case no opportunity occurred of applying them practically. But if fortunate enough to make the application, they will keep the method of manufacture, etc., away from the knowledge of the public; otherwise, competition would at once spring up in their line of business.

All the stimulus for improvement that now exists in inventions would be lost, for the reason that the inventions themselves would be known only to a few, and imperfectly at that, and also from the fact that an improvement would, in ninety-nine cases out of a hundred, prove of no advantage to the one making it. In short, without protection by patent, men of brains would be at the mercy of men of means; they cannot well afford to be cheated out of what they earn.

Another Hecatomb of Victims.

THIS time it is not a railroad disaster—a train of cars, filled with passengers, tumbling down a precipice or falling through a trestle-bridge—but another of those appalling accidents peculiar to the coal districts of Europe. The Atlantic Cable brings news of a terrific colliery explosion in the coal mines near the city of Dresden, Saxony, by means of which over *three hundred* miners have met an untimely death. We have learned nothing as yet of the real cause of the disaster, whether it be on account of remissness on the part of superintendents and overseers, negligence on the part of the men, or, mayhap, from some cause so subtle and quick in its action as to have overcome in an instant the most careful precautions. We anxiously await further intelligence in regard to the matter.

The Steel-Rail Movement.

WE hear that Mr. Robert H. Sayre, Chief-Engineer of the Lehigh Valley Railroad, accompanied by some of our iron manufacturers, is in England, making a personal inspection of the various processes for manufacturing steel rails. As a result of this visit, another establishment for steel-rail manufacture may, perhaps, be constructed before long in this country.

MARKET REVIEW.

The Coal Trade.

NEW-YORK, August 13th, 1869.

THE coal trade during the past week has continued in a very unsettled condition. Dealers have been holding off from making purchases owing to the disturbance in the market and the fluctuations in prices; but within the past day or two a better feeling has prevailed, and Schuylkill coal is selling more freely at prices ranging from $8 to $8.50 for choice Locust Mountain coal. Many of the shrewdest buyers are looking around the market for choice lots of coal, believing that "bottom has been touched." Consumers are not purchasing freely as yet from dealers, and seem determined to hold off until necessity compels them to purchase. In this they are not acting wisely, as they cannot expect coal to be cheaper at retail than it is now selling for. Dealers are paying to-day from $8 to $8.50 at wholesale by the cargo, and are offering their coal to consumers at from $9.50 to $10 by the single ton, which only affords them a living profit.

The situation in the Lackawanna region remains without change. The Pittston Company's men are all at work, having accepted the terms of the Company; while the Scranton and Delaware and Hudson Companies are still refusing to negotiate with their men "on the basis plan," and it does not yet appear what may be the solution of this contention between "labor and capital." The operators in the Lehigh are not satisfied with their arrangement with their men, and are demanding to have the basis of wages depend upon the price of coal at Mauch Chunk. A meeting of the operators was held at Mauch Chunk, August 12th, when it was determined to make a change in the terms of the basis. What action the men will take remains to be seen. A strike is not improbable.

The discussion of the "coal question" continues in the city papers, and the general conclusion seems to be that a removal of the duty on coal will cure the evils of monopoly and high prices. While we are in favor of as low prices for coal as can be afforded to keep the coal interest fairly remunerative to all concerned, we cannot see how prices are to be affected by a removal of the duty on coal, for the simple reason that Pennsylvania produces all the anthracite coal that is mined. It is found in no other section of our country, or in the world, practically (a very limited amount is mined in Wales). *Soft* coal, which is mined in Nova Scotia, and also largely in Maryland and Virginia, has not advanced in price. The best quality of George's Creek coal can be purchased by the cargo to-day, afloat, in New-York, for $7 per ton; but even at this price it does not come in competition with anthracite coal for domestic purposes. The truth is, the source of all the trouble in the anthracite coal region at present is that a fierce struggle is going on between capital and labor for the mastery, and until this contest is fully settled consumers will be compelled to endure a fluctuation in prices. But we look for a permanent settlement of this question before many months elapse, and, as resulting therefrom, more uniformity in prices.

SATURDAY MORNING, August 14th, 1869.

As we predicted last week, *the operators have struck.* As we go to press, a circular issued yesterday by the Board of Operators in the Lehigh region to the miners, fixing a new basis for wages, is received. There is scarcely a doubt but that the miners will reject the terms offered and will stop work to-night.

PHILADELPHIA, August 11th, 1869.

THE market is very dull. Very few orders are coming in. Vessels are plenty. The steamer *Rattlesnake* made the round trip to Salem, Mass., and return, loading and unloading over 500 tons of coal, in 7 days and 12 hours. The second vessel of the fleet will be ready to load about the 15th of this month.

The following table exhibits the quantity of Coal passing over the following routes of transportation for the week ending August 7, 1869:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Read. R. R.	6,122	1,687,602	113,949	2,292,363
Schuylkill Canal,	1,879	482,375	32,817	385,336
Lehigh Valley R. R.	47,975	1,396,178	65,073	1,319,207
Lehigh & Sus. R. R.	14,593	196,122	20,194	578,600
Lehigh Canal,	15,827	409,776	28,882	343,745
Scranton North,	8,474	297,369		205,857
" South,	23,874	623,857		587,631
Penn. Coal Co., rail,	20,395	525,301	17,084	562,627
" " " canal,	1,188	15,223	718	9,759
Del. & Hudson Rail,			1,800	101,505
" " " canal, N.	51,936	831,397	18,638	631,800
" " " S.				51,174
Shamokin,	8,976	270,075	13,164	200,868
Trevorton,	480	11,869		11,091
Short Mountain,	3,346	56,425	3,194	59,719
Lykens Val.,Can.Co.	2,298	50,420	1,957	39,674
Hunt'g'n & B'd Top,	4,950	140,280	6,725	211,049
Wyoming South,	9,033	117,225	19,414	131,856
" North,				
Williamstown, Col'y	4,760	99,821	6,585	110,024
Total,	316,106	7,210,794	350,194	7,833,885
1869,			316,106	
Increase week,			34,088	

Lehigh Canal Coal Trade.

Shipped for the week ending August 7, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,	4,424 07	94,825 00
" B. Meadow "	4,808 02	53,832 11
" Mahanoy "	192 08	1,636 01
" Hazleton "	9,277 08	91,650 14
" Upper Lehigh "	547 14	4,042 11
" Wyoming "	9,542 07	97,769 01
Grand Total,	28,882 06	343,745 18
Corresponding week last year,	15,827 10	409,776 17
Increase,	13,054 16	
Decrease,		66,030 19

Report of Coal Transported over Lehigh Valley Railroad

For the week ending August 7, 1869, and previously this season, compared with the same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy,	14,621 18	214,543 00	229,164 18
" B. Meadow,	8,308 12	229,856 03	238,164 15
" M. Chunk,		150 10	150 10
" U. Lehigh,	140 19	8,147 15	8,288 14
" Hazelton,	32,966 14	600,060 10	633,027 04
" Wyoming,	10,294 14	239,691 00	249,985 14
Total,	66,332 17	1,292,448 18	1,358,781 15
To L. & S. R. R., at P'n Hav. for rail,		4,174 00	4,174 00
Do. for canal,	9,277 08	86,176 10	95,453 18
At Mauch Chunk for Canal,	4,986 14	52,183 09	57,170 03
Total Anthracite,	80,596 19	1,434,982 17	1,515,579 16
Susquehanna Region Bit. Coal (Fall Creek),		552 03	552 03
l. by rail & canal,	80,596 19	1,435,535 00	1,516,131 19
Same time last y'r,	58,648 16	1,450,741 00	1,509,389 16
Increase,	21,948 03		6,742 03
Decrease,		15,206 00	
Forw'd east from M. C'k by rail,	65,073 07	1,254,134 09	1,319,207 16
Same time last y'r,	47,975 04	1,348,203 15	1,396,178 19
Increase,	17,098 03		
Decrease,		94,069 06	76,971 03

RECAPITULATION:

Forw'd east from M. C'k by rail,	65,073 07	1,254,134 09	1,319,207 16
Del. at M. Chunk,		654 09	654 09
Del. on line of r'd above M. Chunk,	21 00	5,540 04	5,561 04
Del. ab. M. C. for use of L. V. R. R.,	1,106 02	27,241 18	28,348 00
To N. C. R. R., at Mt. Carmel,		2,516 09	2,516 09
To L. & S. R. R., at P'n Hav., for r'l.		4,174 00	4,174 00
Do. for canal,	9,277 08	86,176 10	95,453 18
Do. Packerton for rail,	132 08	2,913 12	3,046 00
At Mauch Chunk for canal,	4,986 14	52,183 09	57,170 03
Total,	80,596 19	1,435,535 00	1,516,131 19

Lehigh and Susquehanna Railroad.

Report of Coal shipped South for the week ending August 7, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,	4,419 12	87,999 11
" Hazelton "	9,442 01	93,297 00
" Upper Lehigh "	3,389 17	73,113 16
" Wyoming "	22,215 05	404,659 04
Grand Total,	39,466 15	659,069 11
Corresponding week last year,	33,352 07	447,360 12
Increase,	6,114 08	211,708 19
Decrease,		
Forwarded South from Mauch Chunk,	19,636 01	430,614 10
Delivered on line of L. & S. R. R., above Mauch Chunk,	557 01	19,147 08
Delivered to Lack. & Bloom. R. R., at Plymouth Bridge,		13,688 06
Delivered to L. V. R. R. Co., at Sugar Notch,		5,151 03
Delivered at Coal Port, for Shipment by Canal,	19,273 13	190,468 04
Total,	39,466 15	659,069 11

Schuylkill Coal Trade.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, August 5th, 1869.

	Tons. Cwt.
From Port Carbon,	11,884 14
" Pottsville,	1,969 07
" Schuylkill Haven,	18,620 00
" Port Clinton,	343 00
Total for week,	32,817 01
Previously this year,	352,519 07
Total,	385,336 08
To same time last year,	482,375 14

Report of coal transported on the Philadelphia and Reading Railroad during the week ending Thursday, August 5th, 1869.

	Tons. Cwt.
From St. Clair,	40,057 02
" Port Carbon,	10,903 03
" Pottsville,	4,451 05
" Schuylkill Haven,	33,794 14
" Auburn,	3,942 03
" Port Clinton,	18,138 18
" E. P. R. R.,	205 13
" Harrisburg and Dauphin,	14,930 08
Total paying freight,	126,423 06
Coal for Company's use,	2,663 16
Total for week,	129,087 02
Previously this year,	2,178,415 16
Total,	2,307,502 18
To same time last year,	1,945,351 05

Cumberland Coal Trade.

The shipments over the Baltimore and Ohio Railroad for the week ending August 7th, 1869, were as follows:

From Cumberland and Pennsylvania R. R.

	Tons.
Consolidation Co.,	2,875.15
Borden Co.,	1,848.16
Balt. & Hampshire Co.,	839.13
Midlothian Co.,	1,384.19
Cooke,	481.06

From Eckhart R. R.

C. C. and I. Co.,	3,718.18

From George's Creek via Piedmont.

George's C. C. & I. Company,	1,156.15
Central "	3,846.15
Atlantic "	267.05
Piedmont "	2,329.06
Swanton "	1,040.11
American "	2,439.09
Barton "	886.01
Potomac "	1,858.02
Franklin "	2,983.13
Hampshire "	2,574.17
Total,	19,835.00

Cumberland Coal Trade.—Continued.

For the week ending August 7th, 1869, the shipments by the Chesapeake and Ohio Canal were as follow:

	Tons.
American Co.,	4,527.04
Borden Co.,	2,496.06
Central Co.,	4,444.12
Consolidation Co.,	3,421.01
C. C. & I. Co.,	1,282.14
Hamp. and Balt. Co.,	1,494.09
Midlothian Co.,	868.09
George's Creek Co.,	981.09
For private parties,	653.13
Total for week,	20,169.19

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW-YORK, Aug. 12th. R. A.	W. A.	AT PHILADELPHIA, Aug. 12th. R. A.	W. A.
SCHUYLKILL.				
Lump,	$....	$8 25	..	7 50
Steamer,	....	8 00	....	7 50
Broken,	....	8 00	7 25	7 50
Egg,	....	8 00	7 25	7 50
Stove,	....	8 50	7 25	7 50
Chestnut,	....	7 50	6 50	6 50
Pea,	....	....	....	....
LEHIGH.				
Lump,	8 50	....	7 75	....
Steamer,	8 35	....	7 75	....
Broken,	8 35	....	7 75	....
Egg,	8 35	....	7 75	....
Stove,	8 35	....	8 00	....
Chestnut,	8 90	....	7 00	....
Pea,	....	....	5 25	....
SPECIAL COALS.*				
Diamond Vein,	R. A. 8 50	....	....	.. ..
New-England,	"	....	....	....
Locust Dale,	W. A.	8 25	....	....
Honey Brook, Le'h	"	8 35	....	....
Harleigh,	"	8 35	....	....
Spring Mount'n	"	8 35	....	....
Sugar Creek,	"	8 35	....	....
Sugar Loaf,	"	8 35	.. ..	.. ..
Fulton,	"	8 35	....	....
Stout,	"	8 35	....	....
Old Comp'y's	"	8 35	....	....
Cross Creek,	"	8 35	....	....
Chauncey,	"	....	....	....
Girardville,	"	....	....	....
McMichael,	"	....	....	....
Duncan,	"	....	8 00	....
Shamokin,	"	8 25	7 50	....
Lykens Valley,	"	....	8 00	....
Broad Top,	"	....	5 25	....
Hill & Harris,	"	....	7 25	....
Henry Clay,	"	....	7 25	....
Powelton,	"	....	7 00	....
Burnside,	" R. A.	....	8 00	....

[* Dealers in these coals may be found in our advertising columns.]

Kittaning Coal Co.'s Phœnix Vein, f. o. b. $5 50
Lemon " .. " 5 25

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port,	..	..	..	..	..	..
Pittston at Newb'g,	8 60	8 60	8 60	8 60	8 80	8 20
Lacka'na at Rond't,	8 30	8 30	8 30	8 50	8 90	8 00
Wilk'b're at Hob'kn,	8 50	8 35	8 35	8 35	8 35	8 00

For freights to different points, see "Freights."

Foreign and Provincial Freights.

August, 1869.

Foreign.
New-Castle and Ports on Tyne, ... £15@£18 keel.
Liverpool, ... 15s. 17s. ton.

TO NEW-YORK.

Provincial.
Sydney, ... $3 25
Lingan, ... 3 25
Cow Bay, ... 3 25
Port Caledonia, ... 3 25
Little Glace Bay, ... 3 25

TO BOSTON.

Sydney, ... $2 75
Lingan, ... 2 75
Cow Bay, ... 2 75
Port Caledonia, ... 3 00
Little Glace Bay, ... 2 75

Prices at Baltimore, August, 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load,	$7 25
Pittston and Plymouth,	$7 00 7 25
Shamokin R., or W. Ash.,	7 25 7 50
Lykens Valley, R. A.,	6 75 7 00
Trevorton, R. A.,	6 50 6 75
By retail, per ton of 2240 lbs. delivered,	8 50 9 00
Georges Creek & Cumberland f. o. b. at Locust Point for shipping,	5 00
West Fairmount Gas, f. o. b.,	6 50

Prices at Georgetown, D. C., & Alexandria, Va.

August, 1869.

George's Creek & Cumberland f. o. b. for shipping, ... $4 75

Prices at Havre de Grace, Md.

August, 1869.

Wilkesb're & other White Ash for cargoes,	$7 25
Lykens Valley,	7 25
Shamokin R. or W. Ash,	7 00 7 50
Trevorton and Zerba Valley,	6 75 7 00

Prices for Coal at Mauch Chunk.

	L.	Str.	Gra.	Eg.	Sto.	Cst.
Lehigh,	$5 00	$5 00	$5 00	$5 00	$5 00	$4 50
Wilkesbarre,	5 00	5 00	5 00	5 00	5 00	4 50

Freight to Elizabethport, $3.17; to New-York, $2.35.

Prices of Foreign Coals.

August, 1869.
Duty, $1.25 per ton.
Corrected weekly by PARMELEE BROS., 32 Pine-street, New-York.

Liverpool Gas Caking,	$ 9 50	
" " Cannel,	14 00	
" House "	18 00	19 00
" " Orrel,	16 00	18 00

Per ton 2240 lbs., Ex. Ship.
PRICES FROM YARD.

Liverpool House Orrel, screened,	$16 00	$18 00
" " Cannel, "	18 00	20 00

Per ton 2000 lbs., delivered.

Prices of Gas Coals.

August, 1869.

PROVINCIAL.

Duty, $1.25.	Coarse. Gold.	Slack. Gold.
Block House,	$1 75 @	75
Gowrie,	1 75	75
Lingan,	1 75	75
Sydney,	2 13½	71½
Pictou,	2 13½	1 18½
Little Glace Bay,	1 50	1 00
Caledonia,	1 50	75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.,	—	—
Despard Coal Co.,	$8 50	8 00
Penn.,	—	—
Newburg Orrel Gas,	—	—
West Fairmount Gas Coal,		8 00

AT PHILADELPHIA.

Powelton,	7 80

Freights.

August, 1869.

To Eastern Ports.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Stamford,	$2 00	$1 00	$1 25	$1 25
Norwalk,	2 00	1 00	1 25	....
Bridgeport,	2 00	1 15	1 25	1 25
New-Haven,	2 00	1 00	1 25	1 25
Hartford,	2 75	1 10	....	1 65
New-London,	2 00	1 15	1 35	1 35
Norwich (and tow),	2 00	1 25	1 45	1 45
Mystic,	2 00	....	1 40	....
Stonington,	2 00	....	1 40	1 35
Sag Harbor,	2 00	....	1 40	....
Bristol,	2 00	....	1 55	1 60
Newport,	2 00	1 40	1 55	1 60
Fall River,	2 00	1 40	1 55	1 60
Providence,	2 00	1 40	1 60	1 60
Dighton,	....	....	1 60	....
Warren,	....	....	1 60	....
Pawtucket,	2 00	....	1 75	1 75
New-Bedford,	2 00	1 40	....	1 75
East Cambridge,	2 50	....	2 00	....
Salem,	2 50	1 75	1 85	1 75
Newburyport,	2 75	2 00	1 95	1 80
Portsmouth,	2 75	1 75	1 90	1 80
Rockport,	....	....	1 90	....
Saco,	2 75	1 75	1 90	1 75
Portland,	2 50	1 75	1 80	....
Bangor,	2 75	....	1 80	1 80
Bath,	2 50	....	2 00	....
Middletown,	....	....	....	....
Amesbury,	2 70	....	....	....
Boston,	2 50	....	....	....
Cambridgeport,	2 60	....	....	....
Taunton,	2 50	....	....	....
Derby,	2 00	1 25	....	....
New-York,	1 55	55	....	....
Hackensack,	1 75	..	....	....
Jersey City,	1 65	35	....	....
To River Ports.				
Troy,	1 75	95	60	65
Albany,	1 75	90	55	50
Coeyman's,	1 60	....	55	50
Stuyvesant,	1 50	....	50	45
Coxsackie,	1 60	....	45	45
Hudson,	....	1 00	40	50
Catskill,	....	....	40	35
Poughkeepsie,	1 60	75	30	25
Fishkill,	1 60	....	20	30
Cold Spring,	1 60	70	30	50
Haverstraw,	....	50	45	55
Nyack,	1 60	50	55	50
Sing Sing,	1 60	....	60	50
Yonkers,	....	40	60	55
New-York,	1 60	50	70	
Saugerties,	1 55	....	35	30
Rhinebeck,	1 60	....	30	35
Rondout,	1 60	60	30	25
Tarrytown,	1 60	80	60	....
West Point,	1 60	75	30	50

Rates of Transportation to Tide Water.

[BY RAILROAD.]

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven, ... $2 50
From Port Carbon, 8 cents per ton more.

TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton,	$1 15
C. R. R., N. J., Easton to Elizabethport,	1 81
	$2 96
Shipping Expenses at Elizabethport,	25
Total,	$3 21

TO PORT JOHNSON.

L. V. R. R.,	$1 15
C. R. R. of N. J.,	1 80
Shipping Expenses,	25
Total,	$3 20

TO HOBOKEN.

L. V. R. R.,	$1 15
Morris & Essex R. R.,	1 63
Shipping Expenses,	25
Total,	$3 03

Metals.

IRON.—Duty: Bars, 1 to 1¼ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1¼ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ₩ lb; Pig, $9 ₩ ton; Polished Sheet, 3 cents ₩ lb.

Pig, Scotch, No. 1, ₩ ton,	38 —@42 —
Pig, American, No. 1,	42 — — —
Pig, American, No. 2,	38 — 39 —
Pig, American, Forge,	36 — — —
Bar, Refined, English and American,	85 — 90 —
Bar, Swedes, assorted sizes (gold),	82 50, 87 50

STORE PRICES.

Bar, Swedes, ord'y sizes,	less 5 ₩ ct., — — 140 —
Bar, Refined,	less 5 ₩ ct., 90 — 92 50
Bar, Common,	less 5 ₩ ct., 85 — 87 50
Scroll,	less 5 ₩ ct., 120 — 150 —
Ovals and Half-round,	less 5 ₩ ct., 117 50 142 50
Band,	less 5 ₩ ct., 117 50 — —
Horse Shoe,	less 5 ₩ ct., 117 50 — —
Rods, ¼ to 3-16 inch,	less 5 ₩ ct., 97 50 155 —
Hoop,	less 5 ₩ ct., 125 — 180 —
Nail Rod, less 5 ₩ ct.,	— — 9¼ —
Sheet, Russia, as to Nos. (gold),	— 11 — 12½
Sheet, Single, D. and T. Common,	— 5 — 7
Sheet, Galvanized,	List 20 @ 25 ₩ cent dis.
Rails, English (gold), ₩ ton,	— — 56 50
Rails, American, at Works in Pa.,	— 74 — 76

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 2¼ cents ₩ lb, and 10 ₩ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₩ lb,	— 18 @ — 22
English Spring (2d and 1st quality),	— 9 @ — 11½
English Blister (2d and 1st quality),	— 11½ @ — 19
English Machinery,	— 12½ @ — 15
English German (2d and 1st quality),	— 14 @ — 16
American Blister, " Black Diamond, "	— 10½ @ — 16
American, Cast, Tool, "	— 19 @ — —
American, Spring, "	— 10 @ — 13
American Machinery, "	— — @ — 13
American German, "	— 10 @ — 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ₩ lb; Manufactured, 45 per cent ad val.

	All Cash.
Copper, New Sheathing, ₩ lb,	— @ — 32
Copper Bolts,	— @ — 33
Copper Braziers, 16oz. and over,	33 @ — 35
Copper Nails,	38 @ — 40
Copper, Old Sheathing, etc., clean,	20 @ — 21
Copper, Chili Pig,	— @ — —
Copper, American Ingot,	22 @ — 22½
Yellow Metal, New Sheathing,	— @ — 27
Yellow Metal Bolts,	— @ — 27
Yellow Metal Nails,	— @ — 27

LEAD.—Duty: Pig, $2 ℔ 100 ℔s.; old Lead, 1¼ cts. ℔ ℔; Pipe and Sheet, 2¼ cents ℔ ℔.

Galena, ℔ 100 ℔s,	—	@	— —
Spanish (gold),	$6 25	@	$6 35
German "	6 25	@	6 50
English, "	6 25	@	6 87½
Bar, (less 6 ℔ cent)	9 00	@	— —
Pipe and Sheet, "	— —	@	— —

TIN.—Duty: Pig, Bars, and Block, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold, ℔ ℔.		
Banca,	—	@	— 35
Straits,	31	@	— 31½
English,	31	@	— —

Plates.	Gold.		Currency.
Fair to good brands,			
I. C. Charcoal, ℔ box,	$8 50 @ $ —		$11 75 @ $12 00
I. C. Coke,	7 00 @ 7 50		9 75 @ 10 75
Coke Terne,	5 75 @ 6 00		8 00 @ 8 50
Charcoal Terne,	8 00 @ 8 25		11 25 @ 11 75

SPELTER.—Duty: In Pigs, Bars, and Plates, $1.50 ℔ 100 ℔.

	Gold.		
Plates, Foreign, ℔ 100 ℔.	$6 37½	@	$6 50
Plates, Domestic, ℔ ℔.	11	@	12

REMARKS.

IRON.—There has been very little inquiry for either Scotch or American Pig, and with a large and steadily increasing stock, prices favor buyers. The only sales we hear of are 200 tons Glengarnock at $38.5 ⅟, and to arrive, 20 ⅟ do. Eglinton, $38. Wrought Scrap is in moderate request, and sales have been made of 200 tons at a private price. New Rails are in fair demand at $56.50 gold for English, and $74 @ $76 currency for American, at the works; 250 tons old Double-Headed sold at $49.50, and 500 do., to arrive, on private terms. Bar is without change, the business from store being very light, at old rates. We notice sales of 600 tons American Merchant Bars, Flats, and Shapes, delivered here, on private terms. The makers of American Bar will have a meeting this week to consider the subject of an advance in price. Refined Bar has been selling at $82.5 ⅟ delivered in Philadelphia. A parcel of 900 packs Russia Sheet, some time since offered here, we understand, has been taken out of the market. The bark *Reunion* from Cronstadt, with 2000 packs for Boston (where most of the early Iron will be received), struck on a rock off the Shetland Islands, and sprung a leak, making it probable that her Iron will be damaged.

Import, from January 1st to July 31st, 1869.

	BAR.	PIG.	SHEET.
From For'n Ports,	.tons, 9,425	tons, 35,300	bdls. 206,654
Coastwise,	303	.....	7,770
Total,	.....tons, 9,728	tons, 35,300	bdls. 214,424
Same time, 1868,	6,575	16,905	122,266

STEEL is active, but not steady at previous rates.

COPPER has advanced ¼ to ½ cent, with sales of 1,500,000 ℔s. for the week. The best prices paid were 22½ for Lake and Baltimore, cash, and 23 for beginning of September. The general impression is that Copper will advance, if the autumn trade proves good. The Mining Companies have sold freely, and for the present do not offer. Manufacturers have as yet bought little.

The London market is dull at £67 for Chill Bars.

TIN.—At the end of last week, 5000 slabs Straits were sold at 30c. @ 30½c. gold; since then the quotation is 31c. @ 31½c., with a jobbing business only. English 31c., and Banca nominally 35c.

Import, from Jan. 1st to July 31st. 1869. 1868.

PIGS,	.....No. 34,057	52,486
PLATES,	.....bxs. 654,003	491,777

LEAD is dull at 6¼c. gold for ordinary foreign. Sales 2p 300 tons in lots.

Import, from Jan. 1st to July 31st, 1869.

From Foreign Ports,	.....pigs, 317,853
Coastwise Ports,	1,948
Total,	.....pigs, 319,801
Same time, 1868,	238,907

SPELTER.—A jobbing business at 6¾c. gold for Silesian.

Import, from Jan. 1st to July 31st.

1869, ...plates, 265,545 | 1868, ...plates, 115,225

Mining Stocks.

NEW-YORK, August 12th, 1869.

THE transactions at the mining board are few and unimportant. Sales of Gregory are reported at $2, Grass Valley 41c., Benton 10c. @ 12c., and Smith & Parmelee at $2.70. A considerable advance in prices is noticeable in our Petroleum list. Home is now held at $6.50. Wallkill Lead is selling at 15c.

Benton Gold,	$ 12	15
Consolidated Gregory,	2 00	2 05
Grass Valley,	40	—
Gunnell Gold,	—	50
La Crosse Gold,	—	25
Mariposa,	8	8½
" pfd,	15	16
Quartz Hill,	1 10	1 20
Smith & Parmelee Gold,	2 50	2 70
N. Y. & Eldorado,	20	50
Rocky Mountain,	5	8
Central,	20	—
Quicksilver,	15½	16½
Davidson Copper,	—	30
Flint Steel River,	—	4 00
Wallkill Lead assented,	14	16
Tudor Lead,	3 90	—
Cumberland Coal,	35	35½
Lehigh and Susquehanna Coal,	75	—
Bennehoff Petroleum,	30	—
Buchanan Farm,	50	55
Central,	63	65
Home Petroleum,	5 50	6 50
National,	—	2 00
N. Y. & Alleghany,	—	1 00
Northern Light,	45	1 00
Pithole Creek,	1 90	—
Rynd Farm,	20	—
United Petroleum Farms,	18	22
United States,	75	1 00

San Francisco Stock Market.

SAN FRANCISCO, CAL., August 9, 1869.

Stocks.	*Bid per ft.*	*Share.*
Gould & Curry,	96	
Savage,	78	77½
Chollar Potosi,	20¾	20
Ophir,	17	
Hale & Norcross,	103	102½
Crown Point,	31	29½
Yellow Jacket,	42½	42
Belcher,	20	
Imperial,	48	40
Alpha,	18	17½
Kentuck,	175	
Amador,		

ASSESSMENT.

Crown Point Mining Company, $5, coin, per share. Delinquent, September 9th. Sale, September 28th.

COAL SHIPPERS.

E. B. ELY & CO.,
SHIPPERS OF
COAL,
33 Trinity Building, 111 Broadway,
NEW-YORK.
"Old Company's" Lehigh, J. H. Swoyer's Enterprise, Wyoming, Wilkesbarre, and Locust Mountain Bituminous Coal.
E. B. ELY. S. W. ELY.
Apr. 24-1y-q

POWELTON COAL AND IRON CO.,
SOLE MINERS AND SHIPPERS
Of the celebrated
POWELTON
Semi-Bituminous Gas and Anthracite Coals,
104 WALNUT STREET, PHILADELPHIA.
BRANCH OFFICES:
New-York, Trinity Building; 17 Doane-street, Boston; Cleveland, O; Pittsburgh, Pa. Jan. 30-6m-is.

SAMUEL BONNELL, JR.,
Offers for Sale his
SUGAR CREEK
AND
HONEY BROOK
LEHIGH COALS,
OFFICE—43 AND 45 "TRINITY BUILDING," 111 BROADWAY, N. Y.

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Exclusive Miners and Shippers of the Celebrated
HONEY BROOK LEHIGH COAL,
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apr. 20 1y J. B. McCREARY, President.

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Delivered Direct from the Mines of
The Wilkesbarre Coal and Iron Co.,
OR FOR RESHIPMENT AT
HOBOKEN AND JERSEY CITY.
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WHITE, FOWLER & SNOW,
Successors to JOHN WHITE & CO.,
Wilkesbarre and Lehigh Coal,
FOR STEAM AND FAMILY USE.
OFFICE,
ROOM NO. 75, 111 BROADWAY (Trinity Building).
JNO. WHITE. LINDLEY H. FOWLER. LOUIS T. SNOW.
Jan. 1-1y

DAY, HUDDELL & CO.,
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HARLEIGH LEHIGH COAL,
And the Celebrated
HICKORY, BROAD MOUNTAIN, EXCELSIOR, SHAMOKIN AND NEW-ENGLAND RED ASH.
OFFICES,
ROOM 51, TRINITY BUILDING, 111 Broadway.
Philadelphia, 109 WALNUT STREET. Boston, 7 DOANE STREET.
Apr. 20-1y

COXE BRO.'S & CO.,
Cross Creek Colliery,
Miners and Shippers of the Celebrated
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Feb.-1y 111 Broadway.

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H. H. SHILLINGFORD, Treas.
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SOLE MINERS AND SHIPPERS OF
BITUMINOUS COAL,
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Beaverton (PHŒNIX VEIN), Osceola Mills, Clearfield Co.
Unequalled for Steam, Rolling Mills, Forges, Glass Works, Brick Kilns, Lime Kilns, and Coke, for the Manufacture of Steel, etc.
OFFICE:
125 South Fourth Street (Forrest Place).
July 6-6mo

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The undersigned are prepared to contract for the delivery of *this well-known* COAL, either on board vessel at Pictou, or at any port in the United States.
Sample parcels sent as required.
BIRD, PERKINS & JOB,
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Aug. 10-3m

A MAN of middle age and experience, capable of managing a mechanical business or manufactory, desires to negotiate for a permanent situation. West preferred. The objects of his present engagement being nearly accomplished, he refers to his present employers and others. Address Engineer, care W. E. CHURCH, 14 Wall Street, or this office. July 20-tf

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SHIPPERS OF
WHITE AND RED ASH COAL.
No. 228 DOCK STREET, PHILADELPHIA, and No. 19 DOANE STREET, BOSTON.
BURNSIDE RED ASH, SHAMOKIN WHITE ASH, LOCUST MOUNTAIN WHITE ASH COAL.
Jan.1y-is s.a.

THE DESPARD COAL COMPANY
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DESPARD COAL
To Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
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☞ Reference to them is requested. May 30-1y

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Miners and Shippers of the following celebrated
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DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash OLD COMPANY'S LEHIGH; WILKESBARRE.
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OLD CO.'S LEHIGH, HAZLETON, WILKESBARRE, AND SHENANDOAH COALS.
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110 BROADWAY, NEW-YORK.
July 13-1y

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DESPARD COAL, from Baltimore,
PROVINCIAL COAL,
ANTHRACITE COAL.
For sale in lots to suit.
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Yard, West 22d Street, near 10th Avenue.
Feb.27-1y

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For Iron and Steam Purposes.
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Apr.10-tf

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E. L. MORRIS. J. A. BRAMAN.
Apr.24-tf-q

G. B. LINDERMAN & CO.,
MINERS,
Sugar Loaf, Lehigh Coal.
OFFICE:
50 TRINITY BUILDING,
May 23-1y 111 BROADWAY, N. Y.

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SOLE AGENTS FOR THE SALE OF
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Also, dealers in the best varieties of Lehigh, Shamokin and Wilkesbarre
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Analyses and Assays of Natural and Artificial Substances. Researches and Consultations on Chemico-technical Questions. Instruction in Analytical Chemistry and Metallurgy. Aug. 17-1y

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N. Y. DENTAL COLLEGE,
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Jan. 30-tf

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OFFICE, WILKESBARRE, PA.
Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of Mineral property, superintend Mines and Metallurgical Works, Assay Ores, etc. 18-2-qp

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Expert in Iron Ores, Mines,
And Blast Furnaces,
(ASSISTANT ON GEOLOGICAL SURVEY OF MICHIGAN,)
May 7-3m Negaunee, Marquette Co., L. S., Mich.

Adolph Ott, Chemical Engineer,
May be employed professionally as an expert on practical subjects, involving both Chemical and Mechanical knowledge. A specialist in various branches of Technology. Assays and Analyses of all kinds. Address, Editorial Rooms of the "Engineering and Mining Journal," 37 Park Row, New-York City.
☞ Written communications preferred. Nov. 28-tf.

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Rensselaer Polytechnic Institute, Troy, N. Y.,
is open to engagement for the summer months for the examination of Mining Property, or for any work bearing upon Mining or Metallurgy. June 12-tf

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March 27-tf.

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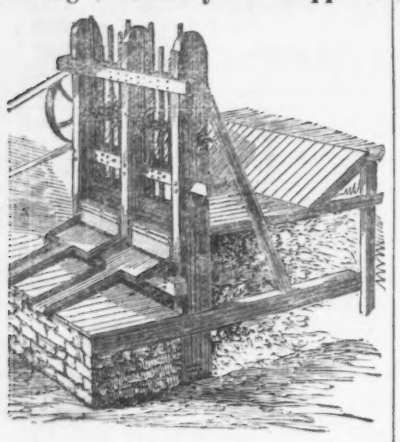

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The **Mechanical Combinations** are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required except keeping the hopper supplied with ore. The power of one man is sufficient to operate a machine that will concentrate one ton per hour.

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Nov. 21-1y-is

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A School of Engineering and Practical Science.

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Degrees conferred in the different departments.

Applicants for admission must not be less than 16 years of age.

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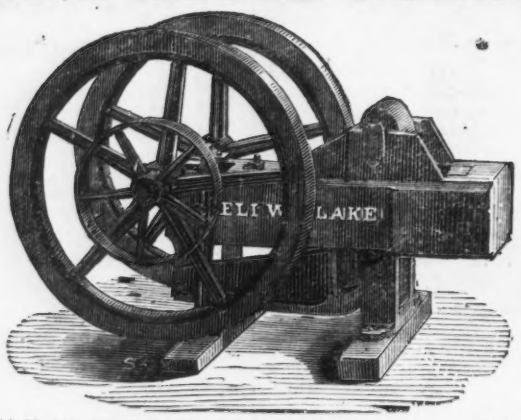
MINING MACHINERY.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

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☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well-contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly wheel, are made and used in violation of our patent.

March 14-1y 351 **BLAKE BROTHERS, New-Haven, Conn.**

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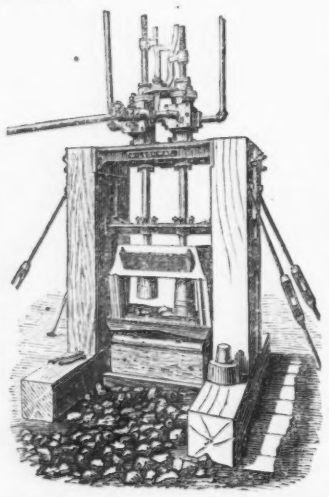
OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



NEW STEAM STAMP-MILLS

AT THE SHORTEST NOTICE.

These Mills have now been in operation for upward of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any Mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For full particulars, call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,

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May 7-1y

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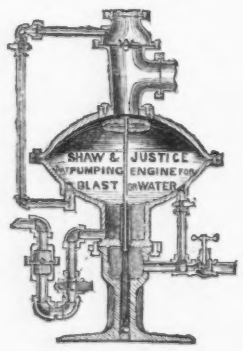
No. 14 North Fifth Street, Philadelphia,

No. 42 Cliff Street, New-York,

MANUFACTURER OF



Engines for Water-Works, Mines, Blast-Furnaces, etc.

ONE HALF OF THE POWER AND PRICE SAVED, AND EFFICIENCY GUARANTEED. Aug. 3

GREAT WESTERN Mining and Manufacturing Company.

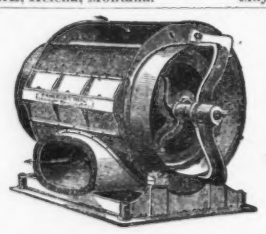
CHAS. HENDRIE, President.

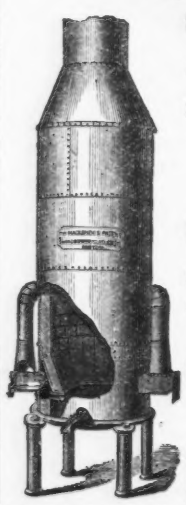
MANUFACTURES OF MINING MACHINERY,

AND WHOLESALE DEALERS IN

Mining Supplies.

Our list of patterns includes all the improved processes for the procuring and saving of Gold and Silver from the ores, and it is the intention of the company to procure the right to manufacture all new improved mining machinery as fast as brought before the public. Our list, in part, is composed of the following machinery: Quartz Mills, stamps of any weight desired. Engines and machinery for same, of any size or description known to the trade. Amalgamators, Crushers, Desulphurizers, Engines, portable, hoisting, and pumping, of the most approved construction. Saw Mills, portable or stationary. Shingle Machines, H. H. Low's Patent. We also furnish in lengths to suit, Steam and Conducting Pipes, Steam Gauges, Brass Fixtures, Bolts, Belting, and, in fact, every thing needed by Mining Companies. Our works are located at the following places: BURLINGTON, Iowa; COUNCIL BLUFFS, Iowa; CENTRAL CITY, Colorado, and HELENA, Montana. The advantage of ordering machinery of us will be plainly seen from the fact of our having branches of our works in the mining regions, thereby enabling the companies to procure their repairs there, without having to send back to the States for same, which they would be compelled to do did they procure their machinery at an Eastern shop. Our prices here are the same as the Eastern prices, thereby saving to the companies the extra expense of freight to the West. We will contract to deliver freight at any point on the Missouri River, and will be prepared to send a competent man to superintend the erection of the machinery at the mill if desired. Plans and specifications of the mills furnished to all ordering machinery of us. We would be pleased to receive an order from you for any thing in our line, and feel confident we can fill it to the satisfaction of your company. All orders for machinery should be addressed to WM. C. HENDRIE, Secretary, Burlington, Iowa. Address for information to C. F. HENDRIE, Council Bluffs, Iowa. CHAS. HENDRIE, Helena, Montana. May 29-6m





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BLOWER and CUPOLA and SMELTING FURNACE.

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About 1500 pounds very superior ENGLISH GUN COTTON,

IN WATER-PROOF COVERING,

(surplus stock) may be had at less than cost of importation. Address

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Apr. 10-tf CAMBRIDGE, MASS.

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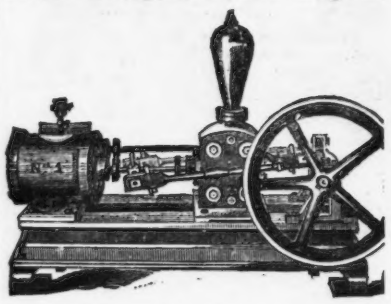
THE WOODWARD Steam Pump Manufacturing Co.

Manufacturers of the

Woodward Patent Improved Safety

Steam Pump and Fire Engine.



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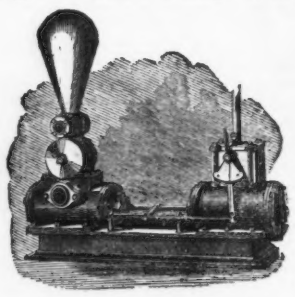

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Patented in England, Belgium and France. Send for circular. feb-13-1y

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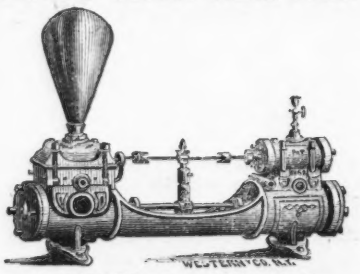

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Air Pumps, Blowing Engines, Hydraulic Pressure Pumps, New Locomotive Pumps, Fire Pumps, Boiler, Feed, Marine, Drainage, Sugar-work, Brewery, Distillery, Oil and Wrecking Pumps.

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MINING PUMPS

(Working with Plungers, and especially arranged for pumping water containing dirty or gritty matter).

Pumps for every possible duty, and all fully guaranteed. Also,

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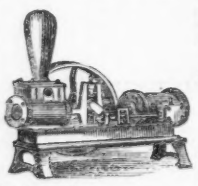

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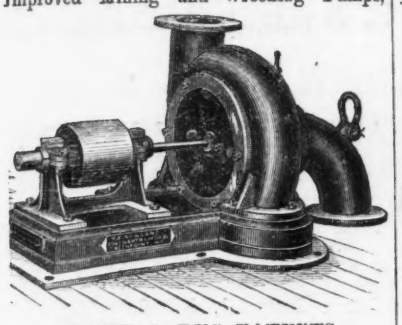

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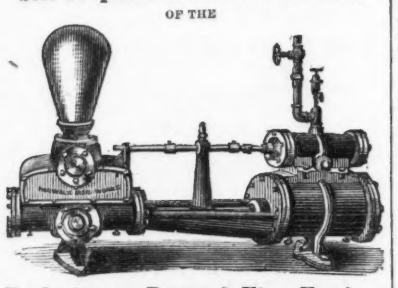

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Air and Vacuum Pumps,

STEAM AND BLOWING ENGINES,

Pumping-Engines for Water Works, Horizontal and Tumbling Beam Engines, Mining, Wrecking, and Supply Pumps.

IRON AND BRASS CASTINGS, of every Description.

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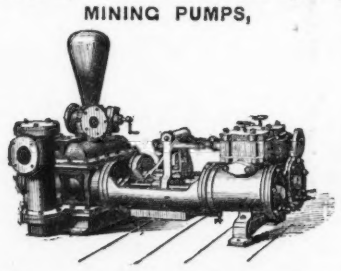
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing-Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

MINING PUMPS,



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FENNER & DUNNE,

COUNSELLORS AT LAW,

Treasure City, White Pine, Nevada.

REFERENCES:

FENNER & PRESTON, 66 Pearl St., N. Y. R. W. RAYMOND, Esq., New-York.

April 17-6m

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SHEET BRASS, GERMAN SILVER

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Gilt, Lasting, Brocade and Fancy Dress Buttons, Kerosene Oil Burners, and Lamp Trimmings.

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Manufactory, Waterbury, Conn. Sept. 21-1y

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GENERAL MINING AGENT,

TREASURE CITY

WHITE PINE COUNTY,

Nevada.

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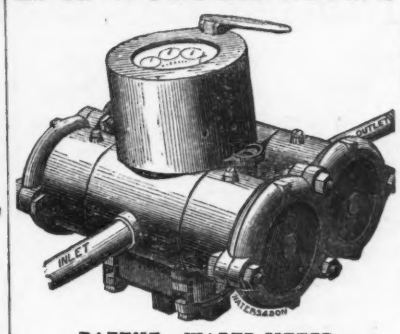
H. R. WORTHINGTON'S



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This Meter is also Used for the Measurement of Oil.

IT COMBINES

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with such ease and certainty of motion as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our larger cities.

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(Successors to WALTON & LEONARD,)

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Iron Pulley Blocks, Twist Drills, Portable Forges, etc.

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Dec. 12-1y

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Patented Articles, etc., etc.

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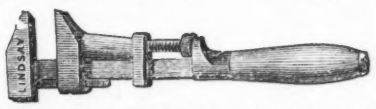

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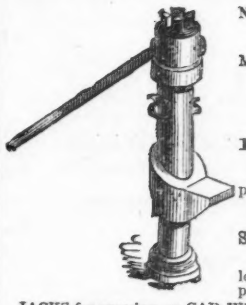

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STEAM HAMMERS.

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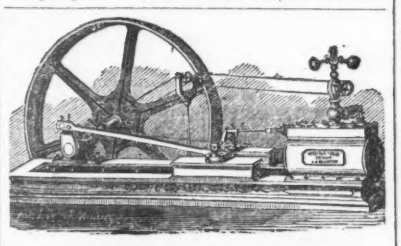

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PATENT FINE CORRUGATED

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Practical tests have demonstrated their superior ability to resist heat, over the flat iron shutters and doors of the best and costliest kind.

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OF ALL KINDS.

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SAFETY BOILER.

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EMERSON'S PATENT MOVABLE TEETH.

These saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established.

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Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-Off and Rip-Saw Machines; Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery.

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April 24-1y-q

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Issue Circular Notes and Letters of Credit for Travellers, available in all the Principal Cities of the World.

Transfers of Money to Europe and the Pacific Coast by Telegraph.

Interest allowed on Deposits. Feb.-1y

The Thirty-Eighth Industrial Exhibition by the American Institute

will be held between Sixty-third and Sixty-fourth Streets, on Third Avenue, in a structure so enlarged as to cover 400 feet by 170. It will be open for the reception of steam-engines and other heavy machinery on August 15th; for the reception of other articles from the 1st to the 7th of September next, and to the public on the 8th. Persons desiring to exhibit works of art, labor-saving inventions, and new products can obtain circulars and blank applications for space by writing to S. D TILLMAN, AMERICAN INSTITUTE, New-York.

Aug. 3-2t

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Mar. 28-1y-q

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Hopton's Conversations on Mines,

BETWEEN

FATHER AND SON.

Enlarged from 112 to 192 pages.

The following are the Contents:

Air, why it is propelled down, into, and around the workings
" Quantity of, produced by the furnace
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans)
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natural ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
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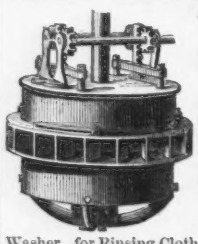

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July tf

1869.

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